

Contractors and Engineers Monthly

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PICKS and SHOVELS

By O. E. POTTER

This Is News!

An Albany, N. Y., wrecking contractor was so well pleased with the work of a crew of twenty-five WPA men supplied him for a job that, according to an AP dispatch, he promised them steady employment for the rest of the year, saying that here was a crew that could do a job well and he intended to keep them.

After the many reports of quite a contrary nature about WPA labor, this is news indeed. But we were wondering—could it be the type of work in which the contractor was engaged that made the difference?

Soliloquy

Behold the Designer! He maketh marks on paper, (called a plan), and acquireth much trouble and gray hair, with no revenue. Also, looketh upon the Construction Engineer! He goeth forth with a light heart into the rain and the cold to have good works done and the Contractor and the Material Man and their Serfs revileth him and curseth his ancestors.

All of which ruineth the disposition and causeth Engineers to see no virtue in each other.

—By J. E. Womersley, Assistant Designing Engineer, Division of Sewerage, Dept. of Public Service, Akron, Ohio.

Health and Your Job

When the French attempted to build a canal across the Isthmus of Panama, they were defeated by disease. And when the United States took over the task of joining the Atlantic and Pacific Oceans, they sent Col. Gorgas and several million dollars to the job in order to provide sanitation and to make it possible for men to live and work there. For no job can be carried to successful completion unless the working

(Continued on page 51)



Spreading the Windrow of Road-Mixed Material

Road-Mix Methods Used In Oregon

Frequent Sieve Tests Used In Formula Developed by Laboratory to Determine Quantity of Oil Required

By N. M. FINKBINER,
Engineer of Materials,
Oregon State Highway Commission

THE summer of 1936 saw the completion of two road-mix jobs in Oregon, one of which will be described briefly. The job was 16.4 miles long, in the south central portion of Oregon on the Fremont highway. Babler Bros., of Portland, was awarded the contract to prepare a pit-run base and lay the road-mix, the gravel base to be laid on 14.65 miles of the road and a 10-inch base to be laid on 1.01 miles. The remaining 0.77 mile, already gravel surfaced, was scarified and reshaped. This base was laid 24 feet wide. Upon this rolled and graded base, a prime coat of RC-3 cut-back asphalt was applied at the rate of 0.2 gallon per square yard.

The specifications for the road-mix aggregate were as follows:

(Continued on page 16)

Handling Traffic Through a Canyon While Building Road

STATE Highway 2 and U. S. 40 are the names for the main highway leading west from Denver to Salt Lake City and it is traversed by heavy through-traffic every day. The 1,500 vehicles that travel over this road were forced to experience short delays due to road construction during last year's construction season. The narrow right-of-way possible, due to the type of country, made it necessary to require that the contractor restrict his work to the worst or bottle-neck sections first and then tackle the more easily constructed portion.

About 1/4-mile from the east end of the job the first of the bottle-necks was encountered. The new road was benched above the old road and the old road used for one-way traffic while the road was open. When blasting was under way the road was closed and the shots timed and so loaded as to minimize the time required to clear a passage through the rock. At this point a Bucyrus-Erie 37-B diesel with a 1 1/2-yard Amsco bucket loaded the rock to a trio of White trucks.

Another interesting arrangement called for by the contract is that the state continued to maintain the road on all sections until the contractor began to work in that section. Then he was required to take over the maintenance. This resulted in the state having several portions of the road still under maintenance and the contractor having several also, with the sections alternating. The state used the equipment of the local maintenance district while the contractor used a Caterpillar No. 11 patrol grader for maintenance throughout. The contractor was paid for the selected material

M. E. Carlson Constr. Co. Faced Difficult Problem to Avoid 21-Mile Detour on Colorado Road

used for the maintenance of the sections he handled.

Drilling and Blasting

Inasmuch as the drilling was the slow part of the work, the contractor put in floodlights so that the jackhammers could work throughout the dark hours. A Kohler 1,500-watt plant furnished current for the two lights that illuminated the area around the drills. A Sullivan V-type 6 1/2 x 5 1/4-inch compressor and a Davey portable compressor mounted on a Ford truck furnished the air for the two Gardner-Denver jackhammers. The latter compressor was held as a standby on this particular section but was used later when more compressor capacity was needed for additional jackhammers. Timken 2 1/2 to 1 1/8-inch detachable bits were used by the contractor with the standard steel.

The drill holes ran from 15 to 20 feet deep in the Idaho schist which is fairly fast drilling. This contractor regrinds his bits twice and then discards them. The earth overburden on the rock cuts was very light indeed and was cleared entirely by hand as the most economical method. The drill and shovel operators worked three 6-hour and 40-minute shifts at the start before the weekend traffic to this mountain playground of the Denverites blocked the work completely. Then the contractor used a night shift of 8 hours for five days a

(Continued on page 38)



Material for the Cajalco Dam, for Which the Griffith Co. Has the Contract, Was Loaded Into a Fleet of Mack Trucks by Northwest Shovels Working in the Borrow Pit



Cajalco Dam in California Is Part of the Colorado River Aqueduct Project to Supply Water to the Thirteen Cities Comprising the Metropolitan Water District of Southern California



After the Trucks Dumped the Material at the Dam Site, It Was Spread by Caterpillar Diesel Tractors with Bulldozers and Then Compacted in 6-Inch Layers by Sheepfoot Rollers

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Imperial Dam Project Progresses Rapidly

Concrete Piles, Special Embankments for Large Desilting Plant, Quarry and Riprap Featured

By JOSEPH C. COYLE

(Photo on page 56)

OVERCOMING a tremendous amount of ground water throughout the construction area, and the rapidity with which dirt is being moved are the outstanding features in the construction of the Imperial Dam and desilting plant 20 miles up the Colorado River from Yuma, Arizona. The Morrison-Utah-Winston Construction Co. received the contract for the project on its bid of \$4,374,240. This firm will pour all concrete, but has subcontracted the excavation, piling and reinforcing steel items.

At one end the dam will divert water to the Gila Valley irrigation project in Arizona; at the other end to the desilting plant at the head of the All-American Canal to irrigate a million acres in California.

The spillway will be a hollow reinforced concrete weir, 31 feet high and 1,200 feet long, resting on the sand of the river bed and partly backfilled with gravel to give added weight. Inside buttresses of reinforced concrete will be 30 inches thick. There will be a gravel-filled drainage trench beneath it, from which any seepage water will be expelled by automatic ejectors. A reinforced concrete apron, 8 feet thick, will extend 65 feet downstream, and a row of interlocking steel sheet piling is being driven across the dam site in line with its lower edge. For 150 feet below this, the stream bed will be riprapped with 3 to 6-foot selected boulders.

A paving slab of reinforced concrete will extend upstream 212 feet above the entire dam, and will be 3½ feet thick at the dam and 6 inches thick at the outer edge. Under it three rows of sheet piling are being driven, the lower one of interlocking steel 40 feet long, the second of 24-foot wood, and the outer row 24-foot wood piling. Three gate structures on the Arizona side, separated by short non-overflow sections, will be equipped with radial gates. Temporary diversion of the river while the middle section of the dam is under construction will be through two of these structures. Headworks on the California end will consist of four roller gates, 23 feet high and 75 feet long, controlled by hoist apparatus on two of the piers between them, and between these and the overflow weir twelve radial gates will let water into a sluiceway extending 3,000 feet downstream to receive silt removed by the desilting plant.

Pile Foundations

On each side of the river the three

rows of sheet piling under the dam and paving slab were driven at the beginning of construction, using a steam hammer swung outside the guides, and a long gin pole lashed to the 40-foot tower of the rig to swing the jet pipe and piling with tackle. A Mundy upright boiler and a Mead-Morrison hoist were mounted on the rig for power. A row of sheet piling was also driven around the intake area on the California end, to cut off seepage from the abutment excavation.

Between abutments and the overflow weirs, on both sides of the river, the dam structures will rest on a network of 2,280 reinforced concrete bearing piles, 45 to 50 feet long, driven on a 3 to 1 batter. The concrete for these piles was mixed in a 3-bag Smith paver, elevated about 15 feet above the ground, which discharged by gravity into Brown-Bevis pneumatic-tired buggies on an elevated runway about 1,000 feet long. This allowed the use of gravity chutes from buggies to forms in pouring. The mixer skip was loaded at ground level. Thirty sets of collapsible steel forms were used. The same equipment, except the forms, is being used to cast 2,710 reinforced concrete sheet piles. Several rows of collapsible steel forms are assembled on wood bases at each side of the runway and reinforcing mats slid in from one end. There are six ¾-inch reinforcing rods in each assembly, four for the body and two for the groove edges, with a ¼-inch rod in the tongue. The latter is held in place by twenty-six V-shaped 3/16-inch rods, tack-welded to bands of the same size, to prevent slipping. The welding is done at a long bench with four rows of short metal pins spaced to hold the V member in place on the bands until welded with a P & H-Hansen portable arc welder. The bands rest on metal straps the length of the bench and are welded and tied in bunches of twenty-six. All other joints in the reinforcing are joined with wire. C. M. Hill of Los Angeles was awarded the subcontract for the cutting, bending and placing of all reinforcing steel.

About 24 hours after pouring, the tops were painted with a black asphaltic paint and the forms for the other piles set up on top of the first. This was continued until each stack contained six piles. They were covered with burlap and kept wet for two weeks, and were not moved for 30 days. The piles were hauled with a Ross lumber carrier.

When possible, the concrete bearing piles were driven almost their full length of 50 feet. Otherwise they were driven to refusal, using three bearing pile rigs, with the second largest size of Vulcan and McKiernan-Terry steam hammers. Jetting was allowed to within 5 feet of penetration. Holes were jetted for about 25 feet before the piles were placed in the guide frames and dropped, with the inside jets going. An auxil-

iary jet on the outside was sometimes employed. Water for the jets on the California side was furnished by a Cameron two-stage 4-inch pump and an Ingersoll-Rand four-stage 8-inch pump.

Throughout the dam and desilting plant area, lines of sheet piling are driven under embankments and anywhere that seepage is likely to occur. At gate structures through embankments a second row of steel piling is bolted to the top of the first and extends up through the embankments for several feet on each side of the structures. About 5,200,000 pounds of interlocking steel sheet piling is used.

Wood sheet piling is made by spiking three timbers together in tongue and groove shape. The 10-inch nails are started with hammers and driven through with Ingersoll-Rand compressed-air rivet hammers, equipped with heads for nail driving, then clinched with a sledge.

Pile driving and the manufacture of the wood sheet piling was subcontracted to Merritt-Chapman & Scott Corp., San Pedro, Calif., for whom Harry Donneck was Superintendent.

Concreting

On the Arizona side, the dam structures are being poured before the abutment. Excavation was done with two 2½-yard Northwest draglines. Considerable blasting was necessary to get down to grade for the upstream paving slab near the abutment site. Drilling was done with Gardner-Denver jackhammers and a portable compressor. The grade for the paving slab is compacted with sheepfoot rollers and

(Continued on page 40)



Work on the North Approach to the Golden Gate Bridge

Golden Gate Bridge To Be Opened This Month

The \$35,000,000 Golden Gate Bridge over the entrance to San Francisco Bay will be opened officially this month. Initial bids on this longest bridge in the world were received on June 17, 1931 but actual work did not start until February 26, 1933. The bridge proper has a total length of 6,450 feet, with a clear span of 4,200 feet. Including the approach roads, the length of the total project is 7 miles.

The accompanying photograph shows the north approach to the bridge, for which Macco Construction Co. was the contractor, with a part of Macco's fleet of Le Tourneau 12 and 14-yard Carryalls, with which 1,750,000 cubic yards of material was moved, in the foreground.

Methods Save Time On Long Overpass

Special Steel Trusses for Falsework; Duralumin Screenshot Used Effectively By R. R. Bishop

(Photos on page 56)

THE Calwa overpass built last summer by R. R. Bishop of Long Beach, Calif., spans the main line of the Santa Fe Railroad a few miles south of Fresno, Calif. It consists of 34 spans of which 28 were typical 40-foot spans, making some standardization in construction possible. The roadway is 44 feet wide and there is a 3-foot 6-inch sidewalk cantilevered over either side. The overall width of the structure is 51 feet. The footings for the piers are at varying elevations because the depth of the hardpan changes considerably in short distances.

Trusses Used for Falsework

By using three complete sets of steel trusses for falsework the contractor was able to pour two complete spans a week with Calveras high-early-strength cement. The re-use of these trusses saved about 25 per cent in the cost of lumber for the form work on this contract.

The trusses were welded structural sections made especially for this contract but were easily salvaged and the resale value is about one-half the first cost. The top chord was a 6-inch channel and the bottom chord a 2-inch channel. The diagonals were standard strap iron and the posts were angles. A single truss for this job weighed about 600 pounds. Three of the trusses were required for each of the seven girders in each span and one truss on either side carried the sidewalk forms.

The trusses were supported at either end by a falsework of 8 x 8-inch posts set on the footings with the top of the falsework about 6 inches below the cap

of the pier. Adjustments in elevation were made with wedges of Australian hickory. The trusses were lifted into place by the contractor's Browning crawler crane which handled the excavation for the footings, the forms and the reinforcing for the entire structure. When set initially, the trusses had a camber of 1¾ inches which was reduced by the loading to the specified ¾-inch camber.

To prevent twisting when the trusses were loaded, they were tied at five places on the bottom chords with 2 x 6's, at the ends of the bottom chords which projected beyond the first end post, just behind the first end post, at one side of the center post and the same at the other end. The ties rested on the bottom chords on all except the trusses supporting the sidewalks and there they were beneath the chords because the trusses were set higher. The ties were used for supporting the staging for the carpenters assembling the forms for the span.

An added feature in the use of steel trusses is the entire elimination of concrete surface cracking, which is especially noticeable when high-early cements are used with wooden falsework supports. When loading wooden falsework, settlement takes place for several hours after the concrete has been placed, causing damaging stresses in the partially set concrete. This is not the case when the steel trusses are used, as full deflection takes place at once and the concrete is allowed to set without further strain or detrimental effects.

The Duralumin Screenshot

What looked to be a truss-supported screenshot that would break the back of any man proved to be a 41-foot 6-inch screenshot that weighed only 400 pounds, including the 2 x 8-inch Douglas fir plank shod with ¾-inch angles to cut the concrete and prevent the screenshot from rounding at

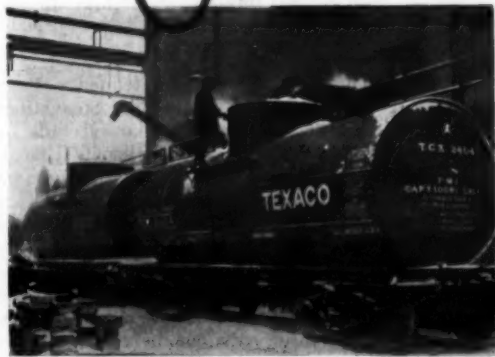
(Continued on page 18)



The Downstream Side of the Dam, Showing Forms for the California Abutment and the Pumpcrete Line on the Trestle



Meet T.C.X. 2479"



Tankcars being loaded with TEXACO Asphalt at the Providence, R. I., refinery of The Texas Company



A string of tankcars delivering TEXACO Asphalt for a paving project in Evanston, Ill.

T. C. X. 2479 is a railroad tankcar of 10,000 gallons capacity. It is one of the cogs in the smooth-running TEXACO Asphalt delivery system. You may run across it almost anywhere.

During 1936, T. C. X. 2479 and the rest of the huge fleet of tankcars carrying TEXACO Asphaltic materials covered a total distance of 11,500,000 miles. To better appreciate the extent of this mileage, consider the distance across the United States from New York City to Los Angeles; then multiply that by 3,300.

In the course of their extensive travels last year, these tankcars delivered approximately 150,000,000 gallons of TEXACO Asphaltic products for use in America's streets and highways, and in miscellaneous other industries.



ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City
CHICAGO CLEVELAND KANSAS CITY HOUSTON DALLAS BUFFALO PHILADELPHIA RICHMOND BOSTON JACKSONVILLE

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Traffic Signals—Their Visibility a Prime Requisite for Safety

The basic idea behind traffic signals is to expedite vehicular traffic by preventing tangles at intersections. Safety and the protection of pedestrians are important parts of that fundamental concept of control. A sore spot in the control of traffic in this manner has arisen and needs surgical treatment.

This was brought to our attention by a paper presented before the American Society of Civil Engineers at its annual meeting by A. H. Vey, Traffic Engineer, Division of Traffic Control and Regulation, Department of Motor Vehicles of the State of New Jersey. New Jersey has made a remarkably thorough survey of traffic accidents on a number of its thoroughfares and has taken drastic measures to correct conditions which were obviously bad. An example of this is the widening of Route 25 from three lanes to four lanes with a raised medial strip. Thus over-anxious drivers hurling their machines along the highway at unnecessarily high speeds are restrained from crashing into the machines of similarly disposed drivers coming in the other direction.

A less obvious condition arose in Elizabeth, N.J., when certain changes were made in Routes 25 and 26 to improve traffic movement. The curb between the thoroughfare and the service road at each side was removed to increase the width of highway available for through traffic. It was believed that this would reduce the number of accidents, most of them minor in character but nevertheless resulting in property damage. Much to the astonishment of the engineers studying traffic accidents in New Jersey, the actual result was an increase in minor accidents in this section. A painstaking survey, taking the form of driving cars through this intersection during periods of heavy traffic, finally solved the problem. The traffic

light was in such a position that its warnings were not readily seen by all drivers. This seemingly simple matter of insuring visibility of traffic lights from all angles of approach is perhaps the solution to many such traffic problems at intersections.

Our own observations during several hundred thousand miles of driving indicate another problem, namely, that the out-of-town driver is generally not given sufficient warning of an impending traffic change. The motorist, the taxicab driver, and the truckman from the community, who are familiar with the traffic light cycle, know just how to time their braking to a split second. To warn the "foreign" driver, we suggest the installation of a reasonably large independent caution sign suspended over the roadway at such an elevation that it can be seen by motorists driving the usual distance behind mountainous trucks. It would seem that such a distinct, illuminated warning, in large yellow letters formed of gas-filled tubes and reading

TRAFFIC CHANGE

Slow Down

flashed a few seconds before the traffic lights actually change would greatly reduce the number of rear-end collisions at intersections of through highways frequented by out-of-town cars.

We are reliably informed that such signs, exclusive of circuit devices necessary for their operation, could be manufactured in quantities for about \$30 each. When one realizes the number of bumpers, mud-guards and bodies which would remain in their pristine loveliness and the number of drivers and passengers who would be saved from bodily discomfort and perhaps injury, the investment seems truly small.

A Warning to States Acquiring County Roads

And a warning to counties, might be added to the title of this editorial. Merely transferring a large mileage of county roads to the state highway system does not improve the financial setup.

Minnesota, among other states, has come to rue the day when she took over 4,500 miles of county highways and added them to the state system. Minnesota's predicament was disclosed early in March by N. W. Elsberg, State Highway Commissioner, when he told the House Motor Vehicle Committee of the Minnesota Legislature about the 4,000 miles of "orphan" roads in Minnesota. In 1933 Minnesota took approximately 4,500 miles out of the county class and added this mileage to the state highway system. Of this 4,500 miles, less than 500 has been approved by the Federal government for inclusion in that part of the state trunk system known as the Federal-Aid system. Federal regulations require that all Federal-Aid money allotted to the Minnesota State Highway Department be spent on roads which have been accepted as a part of the Fed-

eral-Aid system. Thus these 4,000 miles of legislative additions to the state's trunk system are not eligible for any construction or improvements to be paid for with Federal money.

In the past, Federal funds that were made available for work on secondary and feeder roads could be used on this state trunk system mileage which was outside the Federal-Aid system. In February, however, a new ruling was received from Washington decreeing that this money, all but approximately \$100,000 of the \$650,000 annual Federal allotment to Minnesota, would be paid to the counties when matched by them, and must be used on county roads. This leaves the 4,000 miles transferred from the county system to the state system without any Federal financing. In Minnesota's action in 1933 of cutting its motor vehicle license fees and thus reducing the revenues of the trunk system by approximately \$4,000,000 a year and at the same time adding this 4,500 miles to the state highway system, we have an excellent example of ill-advised vote-baiting legislation.

Unclassified Excavation Costs Money All Ways

We have never been able to understand why a highway department, or any other public body, should desire to let a contract for excavation work on an unclassified basis. Neither have we been able to understand why some few contractors have contended that they prefer to bid on jobs on an unclassified basis.

Engineers Dodge Responsibility

In our attempt to explain these two obscure desires to ourselves we have presumed something like this. The public body letting the work probably recognizes that in certain instances which may occur rather frequently it may be very difficult to predict with any degree of accuracy the definite amounts of the various classifications of excavation which will be encountered. Therefore, when it appears to be more or less difficult to make an accurate survey of the different classifications of excavation, or when such a survey would cost a considerable amount of money, the public body may perhaps choose to avoid the expense, and perhaps avoid liability, by refusing to make any classification at all and by asking the bidders on the job to assume all of the responsibility by making a bid on an unclassified basis, in other words, by agreeing to make the excavation for a certain definite amount per cubic yard regardless of the character of the excavation encountered. We believe that this is not a reasonable method to follow, and that a contractor might just as well be asked to bid a lump sum for excavating the project as shown on the plans.

Smart Contractors

In trying to show ourselves why certain contractors prefer to bid on unclassified jobs, we presume that the unclassified method is preferred by contractors who think that they are smarter than anybody else, and that they can out-guess the owner, and in addition can out-guess their competitors. In certain instances a few contractors have occasionally favored bidding an unclassified price because they thought they were intimately familiar with the job in question, and that from past experience in that particular locality, or for some other reason they could make a very close approximation of the amounts of the different classifications which would be encountered.

We remember several contractors who favored bidding on an unclassified basis. We know of a few instances where the successful bidder actually succeeded in out-guessing everybody, and although the successful bidder's bid seemed to be unusually low he had actually out-guessed—there is no other word for it—everybody concerned and succeeded in making an unusual profit on the job. However, most of the contractors who favored the unclassified basis are now engaged in some other line of work, their guess, which they thought was a very shrewd one, having been so wrong that they suffered a financial disaster which put them out of business.

"Unclassified" Bid Is Costly

We do not believe that public bodies are made up of men who prefer to allow the contractors to engage in a guessing contest which proves to be such a poor gamble that the contractors lose money. Neither do we believe that those same officials are such poor business men that they feel that they have done their duty when, in such a guessing contest, the contractor out-guesses them and causes the public to pay more for the work than it is worth.

Not a Responsible Bid

On the other hand the contractors themselves are frequently the cause of encouraging public officials to let work on an unclassified basis. They at least



"Ya Dropped Yer Hanky, Joel!"

Rules and Regulations For New Federal-Aid Funds

The rules and regulations covering the regular Federal-Aid funds, grade crossing funds and secondary highway funds allocated to the states under the Hayden-Cartwright Act have been issued by the U. S. Bureau of Public Roads. These new special contract provisions do not apply to any of the emergency highway appropriations made heretofore, but only to projects financed under the new Federal-Aid allocations and, at the discretion of a state, to the remainder of the projects in the 1936 and 1937 Federal-Aid program.

One of the changes affecting contractors is that he is now required to go to the Employment Service for unskilled labor only, whereas he was formerly required to do this for intermediate grade labor also. There are some additions to the labor classifications. Only journeymen-grade carpenters may be employed on bridges and culverts. Intermediate-grade carpenters are listed for guard rail and rough work only.

There is also a change in regulation governing the pay-day. Previously contractors had to pay their men on Wednesday of each week. The new provisions omit this, requiring that the contractor must pay once a week, but on any day he chooses.

Copies of the complete rules and regulations governing Federal-Aid contracts may be secured upon request from the U. S. Bureau of Public Roads, Washington, D. C.

contribute to whatever tendency there may be to favor unclassified excavations when they submit unbalanced bids on jobs which are let on a classified basis. We have seen many such instances in the past ten years. We remember jobs where the price bid for solid rock was only five cents a yard more than the price bid for dirt. In our opinion this is obviously not a responsible bid because he cannot conceive of any work on which solid rock can be excavated for as little as five cents per yard more than earth.

Savings in Reasonable Bids

We believe it to be for the best interest of the public, and also for the best interest of the contractors, if the various items in the proposal are bid at fair and reasonable prices for the class of work encountered on the particular job. We believe that bids which are certainly unbalanced should be rejected on the ground that they are not responsible bids. If bids which are plainly unbalanced are instantly rejected by the public officials, there will be no reason for asking contractors to bid on jobs on an unclassified basis. It is certainly reasonable to suppose that if the owner contracts with the contractor to do each class of work for a price which shows every promise of being a fair price for each class of work, he will pay in the end considerably less for the work than if he tells the bidder that he does not know what kind of work there is to be done or how much there is of it, and then asks him what he will do it for.

An Editorial from The Construction Adviser. The sub-heads are ours. Editor.

Machine-Placed Hot-Mix For Widening Old Road

Hemstreet & Bell Use Novel Spreader for Both Slurry Base and Hot-Mix Top on California Project

(Photos on page 56)

VISION and mechanical ingenuity are a blessing to any contracting organization. To Hemstreet & Bell of Marysville, Calif., they indicated the need and produced a new hot-mix spreader which would place and roll narrow widening strips along existing concrete pavements. Such a machine was used successfully during 1936 on a 15-mile contract for a 3.5-foot slurry base and hot-mix top widening strip on both sides of an old 15-foot concrete pavement of 4-inch thickness. The 3.5-foot base course was 6 inches thick and the top course was 3 inches thick when compacted and had a slope of $\frac{3}{8}$ -inch in 3.5 feet away from the pavement to continue the crown.

The New Spreader

The new spreader consists essentially of a frame carrying an adjustable spreader box mounted on a roller in front and wheels at the back, giving a 16-foot wheelbase. The front roll is 30 inches in diameter and 36 inches wide. The rear is carried on an adjustable bull-wheel 42 inches in diameter with a 6-inch face. A wheel 18 inches in diameter with a 6-inch face runs on the old concrete. The bullwheel runs on a leveled strip along the shoulder and can be raised or lowered by a hand wheel from an old grader.

The frame of the machine carries a spirit level at the back where the operator stands and this is set to read level when the machine is adjusted by the bullwheel.

The hot-mix material or the slurry base material is dumped into the hopper carried inside the machine and which is adjustable at both ends by hand wheels. The bottom of the hopper is a series of eight baffles or vanes sloping forward and the angle of this hopper is controlled by four hand wheels at the corners. In operation the vanes or strike-off baffles are carried so that the front vanes are slightly lower than the rear vanes. This permits the placing of the material in laminations and gives a slight initial compaction to the material. The wheels also are used to lift the outer edge of the box when placing super-elevated curves and to lower it when placing a crowned section as in this case.

This machine holds 4 yards of material or about 6 tons. As this was the capacity of the trucks used on this contract it was a simple matter to back a truck across the road, dump its load and pull away while the machine was pulled forward by a Caterpillar Sixty tractor. The machine will spread a 3-inch layer $3\frac{1}{2}$ feet wide and 1,700 feet long in an hour when the truck delivery is satisfactory. On June 17, 1936, this machine laid 18,190 feet of the strip in a 10-hour day.

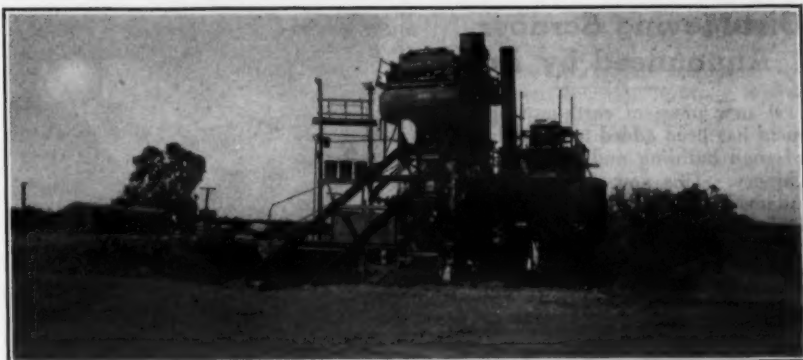
Preparing Trench for Widening

For cutting the trench for the widening strips the contractor used a Caterpillar grader with a drop blade $3\frac{1}{2}$ feet wide in the center. This made it possible to cut the 9-inch depth ac-

curately, as the remainder of the blade and the old pavement acted as controls and the far side of the blade struck off the material approximately at the proper elevation for the tracking of the rear wheel of the spreader. The top of the trench and the tracking strip were finished with a patrol grader.

Slurry Base and Hot Top

The contractor set up his hot-mix plant alongside a pit of tested material and put in a Northwest $1\frac{1}{4}$ -yard shovel to load the material to two White trucks for hauling about 500 feet to the plant. The pit material was end-dumped into



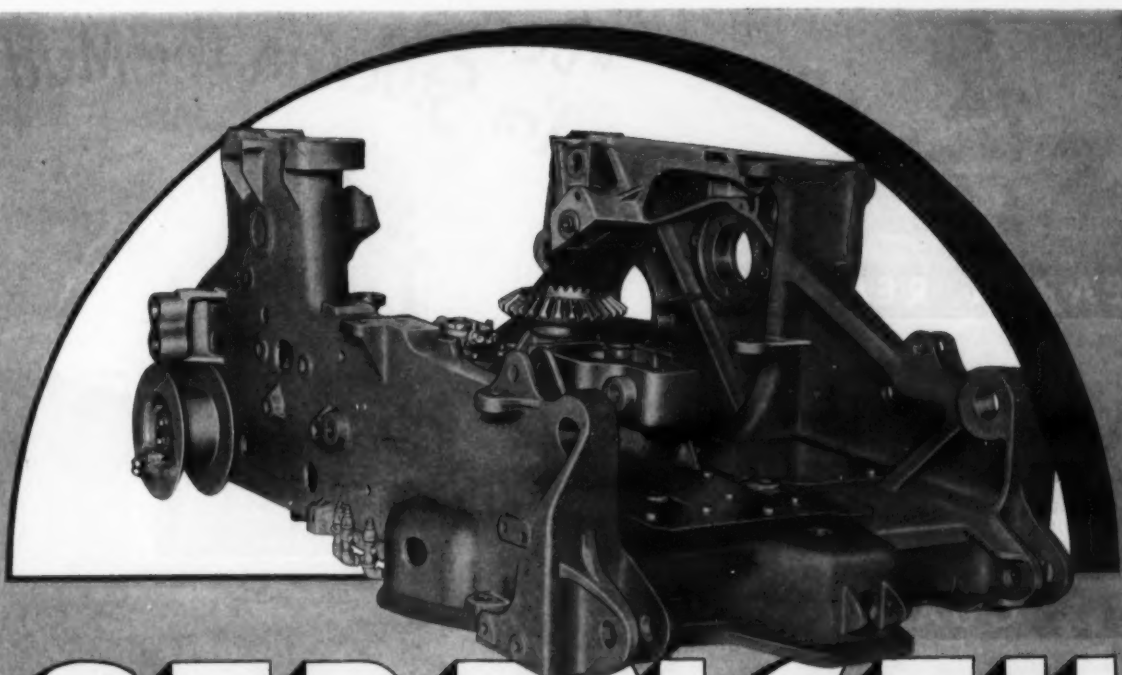
C. & E. M. Photo

Hemstreet & Bell's Portable Asphalt Plant Which Furnished the Hot-Mix For This 15-Mile Widening Contract

a hopper with no grizzly but with a strike-off gate over a slow-moving chain feeder which delivered the pit-run material to a 30-inch belt conveyor. The conveyor delivered the stone and sand to a scalping plate with $2\frac{1}{2}$ -inch round holes. All oversize went direct to a 15 x 36 Universal jaw crusher driven by a

100-hp Allis-Chalmers motor. An 80-foot belt conveyor carried the screened and crushed material up to a double-deck Niagara vibrating screen driven by a $7\frac{1}{2}$ -hp Westinghouse motor. The oversize from both decks of the screen dropped to a Symons 4-inch gyratory

(Continued on page 22)



STRENGTH

you can't buy in any other
Shovel, Crane or Dragline!

This is the rotating base of a $\frac{3}{8}$ yd. shovel—not an ordinary $\frac{3}{8}$ yd. shovel but a Northwest $\frac{3}{8}$ yd. shovel.

It is a sturdy, solid, one piece alloy steel casting. It has years of service written all over it.

Here is design that assures absolute alignment of all shafts and bearings and eliminates weaving that causes excessive wear—a far superior construction to the structural frame work offered by many manufacturers.

Northwests are light enough to go anywhere, yet employ such heavy duty construction as to be able to bring greater profits to jobs that other lighter machines of the same so-called capacity cannot handle.

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NORTHWEST

The World's Largest Exclusive Builders
of Shovels, Cranes and Draglines



Dirt-Moving Scraper Announced by Adams

A new piece of earth-moving equipment has been added to the Adams line of road building and maintenance machinery. This new unit, known as the Adams hauling scraper, is manufactured in 5, 6, 8, 10 and 12-yard sizes.

This scraper is of all-welded heavy-steel-plate construction with a well-braced box-type drawbar. It is operated by cables from a one or two-drum power control unit mounted on a tractor and takes its power from the power take-off shaft on the tractor.

According to the manufacturer, careful engineering has provided the correct angle to the cutting blade which feeds the dirt into the bowl. The depth of cut is adjustable from the tractor operator's seat. After the scraper has been loaded, the bowl is lifted into hauling position and an apron on the front of the scraper is closed with a clam-like action. When the scraper is in hauling



The New Adams Hauling Scraper

position, its entire weight is supported on six large tires and roller bearing wheels which cause the scraper to roll to the dump with the least amount of drawbar pull. By power control, the apron is raised and the load is dumped while the scraper is traveling or stopped. Power required to pull these scrapers ranges from 35 to 40 hp for the 5-yard size up to 80 to 90 hp for the 12-yard size.

Literature describing these new scrapers may be secured direct from the manufacturer, the J. D. Adams Co., Indianapolis, Ind.

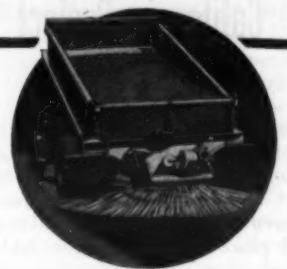
Large-Size Portables For Pneumatic Service

A new line of V vertical air compressors, particularly suited to construction jobs where air capacities greater than those obtainable from portable compressors are required, has been announced by the Sullivan Machinery Co., Michigan City, Ind. Known as the WN-102 series, these compressors are available in three sizes, 445, 550 and 720 cfm actual air delivery.

The design is a two-cylinder V type, two stage and double acting. These compressors are compact and can be moved from job to job by truck or trailer. Each size is self-contained and requires no water service connections for cooling. Any type of drive, direct-connected, V-belt or flat-belt, can be used with diesel or gasoline power units or electric motor. Compressor units consisting of compressor and power unit on skid-type base, or the compressor only can be supplied.

Complete information on these new compressors may be secured direct from the manufacturer by mentioning this magazine.

SMOOTH—STRAIGHT SPREAD—ANY DEPTH ALL MATERIALS with BURCH CHIP SPREADER



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Back truck on—hook up in three minutes. Raise or lower and control blade weight on roads hydraulically. Total length of blades three times that of single blade scraper.

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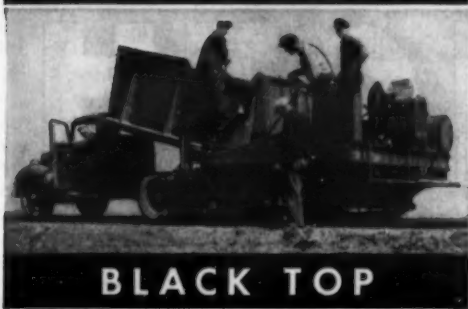
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EARTH REMOVAL



QUARRY



BLACK TOP



READY MIX

Below: Standard Ford Truck Chassis converted by Thornton Four Rear Wheel Drive, ready to handle any of the above bodies. 10 other wheel-bases optional.



"Boss,
I'm Stuck in the Mud"



GO THROUGH with THORNTON FOUR REAR WHEEL DRIVE!

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These results are all found in the THORNTON FOUR REAR WHEEL DRIVE, as engineered into any standard 1½ ton truck. These results—and more!

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New Outlet in Reno For Highway Traffic

West Second St. Underpass
Built by State Highway Dept.
Clears North and South
Through Traffic

FOR many years there has been a bottle-neck in Reno due to the inability of motor traffic from the south to get through the city readily and onto the main highway, U. S. 40, for Sacramento and San Francisco. When money became available through the recent appropriations for highway construction which allotted a definite amount for the construction of grade separations, the Nevada State Highway Department selected the problem at West Second Street as one which could be solved by the construction of an underpass. FAP 141 under the Southern Pacific tracks was constructed last summer to relieve this congestion.

The first work was the construction by the Southern Pacific of 1,200 feet of shoo-fly track on a gravel fill with ample allowance for the stability of the fill when the side cuts for the underpass were completed.

Excavation

Excavation of the roadway approaches was done with a 2-yard North-west shovel and the rock and gravel were stockpiled for backfill against the approach walls and the abutments.

With ground water only 8 feet below the surface of the ground and the excavation extending to 22 feet below the grade, sump pumps took a prominent part in the work. On the pump sump excavation a Jaeger 3-inch sump pump was used, and for the general excavation a 6-inch self-priming Jaeger 1,200-gpm pump was installed with a 3-inch in reserve. The 6-inch pump handled a constant flow of about 800 gpm from the uplands.

Hand excavation of the pump house area and sump was done by ten men who passed the excavated material up from platform to platform for the entire 22 feet to road level. Large stones were hauled out by truck crane with a 30-foot boom mounted on a White chassis. The sump is 35 feet long by 8 feet wide and 22 feet deep.

Underpass Foundation

A foundation seal for the abutments was poured 3 inches thick of Class A concrete, 580 pounds of sand and gravel to 94 pounds of cement, and cured with water, followed by a waterproof priming coat of asphaltic paint. On this a coat of hot asphalt and a layer of asphalt-treated canvas was laid and repeated three times, giving three layers of membrane and four of asphalt. The outside of the walls against earth were similarly treated up to ground water elevation.

Roadway Foundation

A "weight slab" 4 feet thick at the

middle and 1 foot thick at the sides was poured on the roadway section to hold the roadway against ground water pressure. This was mixed with 4 sacks of cement per yard of concrete, using 3-inch maximum aggregate.

Quantities

Work on this underpass was started April 27, 1936, with an allowance of 160 working days for its completion. The contract price was \$92,496.80. The major quantities were:

Roadway excavation.....	20,883 cubic yards
Select borrow.....	1,080 cubic yards
Structure excavation (pump sump, hand labor).....	450 cubic yards
Class A concrete.....	1,680 cubic yards
Reinforcing steel.....	182,500 pounds
Structural steel.....	424,000 pounds
(including two 74-foot plate girders and 1-beam floor beams)	
Asphaltic waterproofing.....	11,500 square feet

Personnel

The contractor for this work was J. F. Knapp of Oakland, Calif., for whom Joseph Shaw, a partner, was General Superintendent. For the Nevada State Highway Department, William Gottlieb was Resident Engineer.

States' Evidence on Accidents

Of the 30 states which showed increased death totals from traffic accidents last year, the National Safety Council reports that more than half have not performed notable work in any important branch of traffic safety effort, although several have recently started such activities which should show results in 1937.

The 18 "honor-roll" states which reduced their traffic accident deaths last year and the percentages of reduction are as follows:

New Hampshire	18 per cent
Nevada	15 per cent
Nebraska	12 per cent
Connecticut	10 per cent
New York	9 per cent
New Jersey	9 per cent
Iowa	9 per cent
Ohio	8 per cent
North Carolina	8 per cent
South Dakota	8 per cent
Wisconsin	7 per cent
Oklahoma	6 per cent
Virginia	5 per cent
Utah	3 per cent
Texas	1 per cent
West Virginia	1 per cent
Maine	1 per cent
Kansas	0.3 per cent

Twenty states with standard drivers' license laws had but a 1 per cent increase in traffic deaths compared with a 7 per cent increase in states without such legislation.

The Minister of Public Works of El Salvador has announced that during 1936 the Government spent \$230,660 on the Salvadoran section of the Inter-American Highway.

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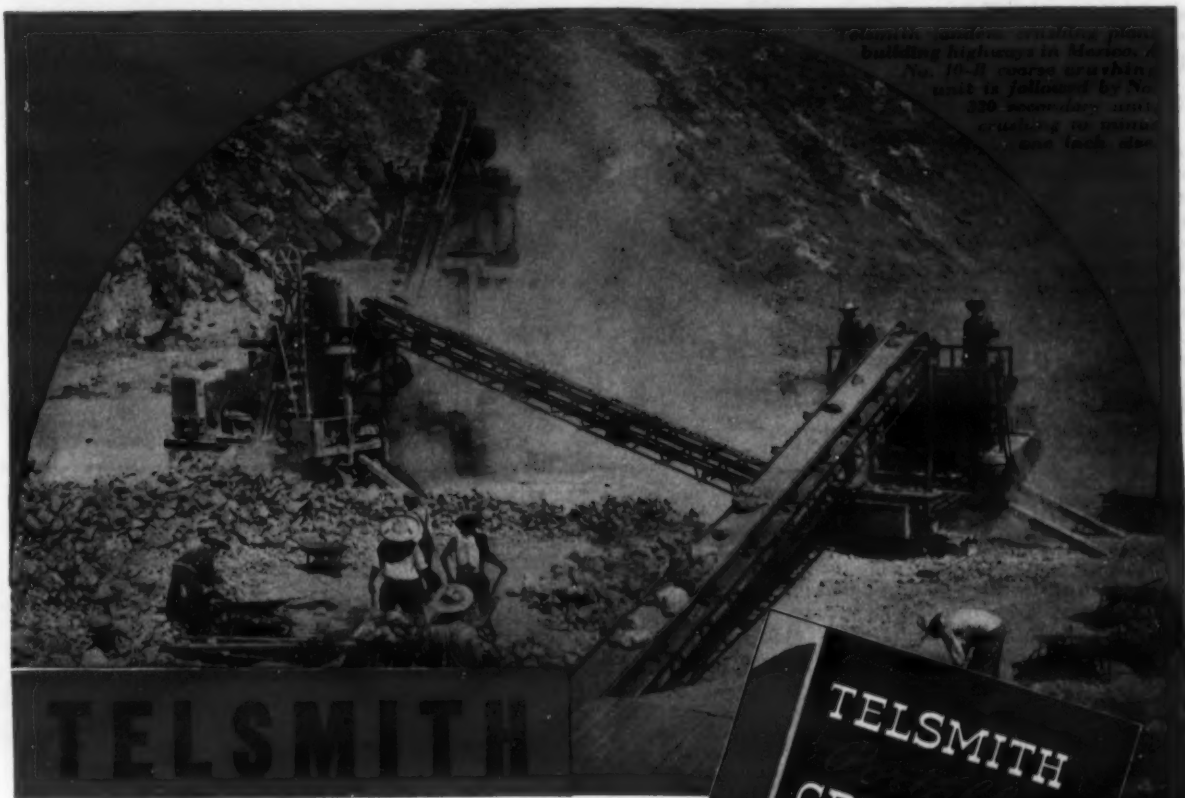
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TELSMITH Portable CRUSHING, SCREENING and LOADING PLANTS

With the trend in portable crushing operations towards bigger output and finer sizing, you'll want to know about the improvements and new combinations in portable plants. Just coming off the press is a new, illustrated 24-page bulletin with the whole story. It describes:

Telsmith Standard Portable Crushing, Screening and Loading Plants—both for coarse crushing and for fine reduction...the crusher in closed circuit with bucket elevator and vibrating screen. Furnished with jaw, gyratory or reduction crusher.

Telsmith Coarse Crushing Outfits—Mounted jaw or gyratory crusher, not in closed circuit; rugged, big-capacity outfit for quarry or gravel pit operations.

Telsmith Tandem Crushing Plants—A super-crushing outfit for quarry use—a tandem combination of a big coarse crushing unit...followed by a large capacity, fine crushing, screening and loading plant, operating in closed circuit.



Telsmith Dual Crushing and Screening Plants—An exceedingly mobile unit combining jaw breaker and roll crusher with more ample screening and conveying capacity.

General Utility Crushing Plants—A "jack-of-all-trades" unit with either jaw or gyratory crusher—also elevator and engine, on truck.

When writing, ask for Bulletin P-34.

PC-1-37

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Electrical or Mechanical Time Lock
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N. C. Stabilized Job Stands Winter Well

Methods Used to Construct 5.6-Mile Job With Calcium Chloride, and Results of Winter Traffic

By W. VANCE BAISE, State Highway Engineer, North Carolina State Highway and Public Works Commission

NORTH CAROLINA'S first road project stabilized with calcium chloride was on State Route 43 between Warrenton and Hollister. The length of the section was 5.627 miles.

The road was first scarified to a depth of 4 inches with a Lakewood 10-tooth scarifier until the material was partially pulverized. Immediately after scarifying, 1½ pounds of Solvay calcium chloride per square yard was spread with a regular lime spreader pulled by a truck. This was found to give very satisfactory results in spreading the calcium chloride uniformly.

The roadway was then disked with a No. 10 double harrow until thoroughly pulverized, after which a motor grader was placed on the section and loose material was bladed back and forth along the roadway until it was thoroughly mixed. At intervals it was necessary to use a water wagon to supply the proper amount of moisture. The final shaping was done with a motor grader.

After a period of about 10 days, when the road had been properly shaped and compacted, ¾-pound of calcium chloride per square yard was applied in the same manner as the first application. The surface application of the calcium chloride was placed while the road was in a damp condition. The road was given a crown of approximately 4 inches in 20 feet in order to assure satisfactory drainage, in accordance with the recommendations of the representative of the calcium chloride company.

The work was accepted from the contractor, the Hardaway Contracting Company of Columbus, Ga., last October.

Equipment

The equipment used on this project included one motor grader, one 35 tractor, two trucks, one lime spreader, one Lakewood scarifier, one No. 10 double-disc harrow and one water wagon.

Condition after Winter Service

This road is in very good condition after the winter but it gets muddy and cuts up after heavy rains. Arrangements are now being made to place an additional surface application of calcium chloride on this section of road. The amount used will be approximately one pound per square yard. It is believed that this will keep the base material intact and prevent any of it blowing away in extremely dry weather.

Approximately 200 motor vehicles a day use this road at the present time.

Movable Floor for Trucks

A unique development in truck body design, a movable floor which simplifies loading and unloading, has just been announced by the Easton Car & Construction Co., 10 East 40th St., New York City. This new floor, known as Loryflor, consists of a single sheet of very durable cord rubber belting supported beneath by tiers of steel rollers. The belting is long enough to be rolled one complete floor length to either end of the truck. This complete movement of the floor from end to end of the body provides an entirely new method of loading and unloading.

Loryflor is operated by means of a crank handle which is used to roll up



Something New in Truck Body Design,
The Loryflor Movable Floor

the floor. The operator may use this handle at either end or on either side of the truck. It requires very little effort for one man to move the load in or out of the truck body, regardless of the weight or nature of the load, according to the manufacturer, and a complete movement of the floor may be accom-

plished in a few seconds. At all times the loading or dumping action is controlled by the operator. Almost any type of load such as sand, gravel, or large pieces of heavy machinery can be handled by the Loryflor.

800,000 N. J. Citizens Are Still in the Mud

On the township system of roads, covering 10,000 miles, live 20 per cent of the total population of New Jersey, or 800,000 residents of the state. Upon these roads, many of which are streaks of mud, less than \$200 a mile is spent for maintenance and improvement, or less than 4 cents per linear foot, Jacob D. Spiegel, Acting President of the New Jersey Association of Township Committeemen, recently asserted at a hearing before the State Senate highway committee, according to a report from the American Petroleum Industries

Committee.

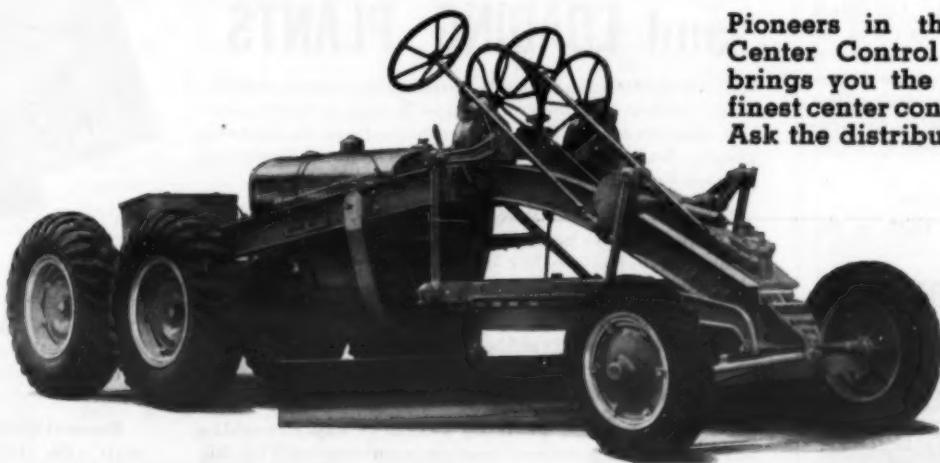
Pointing to the fact that \$72,000,000 of funds collected from the motorists of the state have been "misappropriated" to non-highway purposes, Mr. Spiegel said that if such funds are "used in the construction and improvement of these dirt roads, it would solve the relief problem and at the same time provide the motorist with something for his money and would relieve the real estate owner of a portion of the burden now imposed."

Jahn Co. Moves to Chicago

The C. R. Jahn Co. has announced that the manufacture of its line of La-Crosse trailers has been transferred from LaCrosse, Wis., to Chicago where new plant facilities and a more central location make possible lower freight rates and more prompt delivery. The new location of the C. R. Jahn Co. is the Builders Building, Chicago.



Here is just one case of a WARCO Grader saving money on a super highway job for an eastern contractor. The unit is a WARCO Model 35 with WARCO 8-wheel OCTOPUS Drive. Real power here—fine grading—actual economy.



Pioneers in the construction of Center Control graders—WARCO brings you the new Model "S," the finest center control grader yet built. Ask the distributors listed below.

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**BUCYRUS
OHIO**

Quarrying Andesite For Jetty Contract

**1,400,000 Tons of Rock
Is Required to Rebuild
14,000-Foot South Jetty
At Gray's Harbor, Wash.**

By HENRY W. YOUNG

(Photo on page 56)

GO UP the highway from Portland, Ore., to Seattle, Wash., turn off at Tenino, pass the small towns of Ranier and Vail and "hit the trail". Automobiles can negotiate it at speeds up to 15 miles per hour. Follow this little more than "tote" road until you come to the Skookum Chuck River. The log-

ging railroad of the Weyerhaeuser Timber Co. passes there, and from it is a new spur that stabs up into the wilderness. Then sit on a rock and argue with yourself whether you will walk the ties of the spur for 2 miles along the eyebrows of the gorge or wait for the next scooter which comes down,—schedule indefinite. If you decide to "take a walk", the experience will be by no means unpleasing.

Up at the end of the spur is Skookum Chuck quarry. Out of it comes every day forty-five 60-ton carloads of rock making their way over the Weyerhaeuser line, and the C. M. & St. P., to Hoquiam, Wash., on Gray's Harbor nearly 100 miles distant by railroad.



A Partial View of the Quarry Face, Showing the Rock Well Broken Up And Mostly in Large Pieces as Required for the Jetty

There the cars are barged across the

harbor to Westport for the rebuilding of South Jetty.

The question is: Why locate the quarry in such a remote and difficult spot? Go to the U. S. Engineers who are rebuilding the jetty and they can give the answer. The rock must weigh at least 160 pounds per cubic foot. It cannot, moreover, be sedimentary rock or sandstone, either of which the hungry Pacific would devour in a few years and call for more. In all the rocky and mountainous regions of Washington, this was the nearest place where suitable andesite jetty rock could be located in quantities.

Including the present contract and the preliminary one, completed last July, 1,400,000 tons of rock will be required to rebuild the 14,000-foot South Jetty. The Columbia Construction Co., which is building the Bonneville Dam spillway, secured the two contracts from the U. S. Engineers Department for about \$3,410,000.

The rebuilding of the 34-year-old jetty was started early in 1936 under an ERA contract for \$410,000. The present continuing contract is for \$3,000,000, from River and Harbor funds. At the same time, Congress authorized the construction of North Jetty, 16,000 feet long, on the north side of the harbor entrance, but no contracts have been let on that as yet.

Opening the Quarry

The first thing the contractor had to do, at the start of the work in December, 1935, was to build a branch railroad from the logging railroad in to the quarry site. This was a good job of grading for one shovel, a Bucyrus-Erie 55-B diesel. In this part of the work, 150,000 cubic yards of material were handled, of which 50,000 cubic yards was rock. Coming up to the quarry site, a shoulder in the hillside was encountered, which had to be removed and dumped into the canyon to make room for the contractor's buildings and to start the quarry floor.

It is important to remember that a large portion of the andesite rock of which the cliff is composed must come out in large pieces. The specifications call for Class A rock, of which at least 45 per cent is to be in 6 to 30-ton pieces; Class B, not less than 20 per cent of which must be in 1 to 6-ton pieces; and Class C, 25-pound to 1-ton pieces. The latter is for spreading a 4 to 6-foot layer immediately on top of the partly submerged old jetty and overflowing it.

Here was a nice problem in rock production, for to work the quarry economically it was necessary to blast the rock out of the side of the cliff so that the various classes could be obtained as nearly as possible in the proportions called for in the specifications. Otherwise, there would be a waste of drilling time and explosives, to say nothing of time in wasting unsuitable material into the canyon. In one respect, a novel and effective plan has been evolved, but it did not come without some experiment.

First, wagon drills were used, to remove the shoulder preparatory to entering the quarry. Two Ingersoll-Rand X-71 drills were employed, assisted by twelve S-49 Jackhammers using Jackbits. These worked satisfactorily, as there was no jetty rock in the partially weathered shoulder. All that was necessary was to kick it off into the canyon.

Well-Drill Blasting

In working the quarry, however, this method of drilling, though tried out initially, did not prove satisfactory. The wagon-drill holes could not be sprung sufficiently to hold the necessary amount of explosive. Well-drill holes were then tried, 65 to 85 feet deep, loaded with 0.7 to 0.8-pound of free-running powder per cubic yard of rock. The quarry

(Continued on page 30)

ll get more GRADER PER DOLLAR in a WARCO

Here's Why . . Motor graders of a size compare favorably in price—but—WARCO Graders compare with all the rest in price only. Beyond that they give you extra mechanical features, free from tricky gadgeting; extra quality of materials and workmanship, and unusual durability as is constantly attested by their many users. Investigate!



Pump Standards

The seventh edition of the Standards of the Hydraulic Institute for the pump industry has recently been published. This edition has been completely rewritten and rearranged and much new material added, including a new pump test code, charts for figuring friction of petroleum products in pipe lines, specific pump speed curves, pressure-temperature curves for pumping hot water,

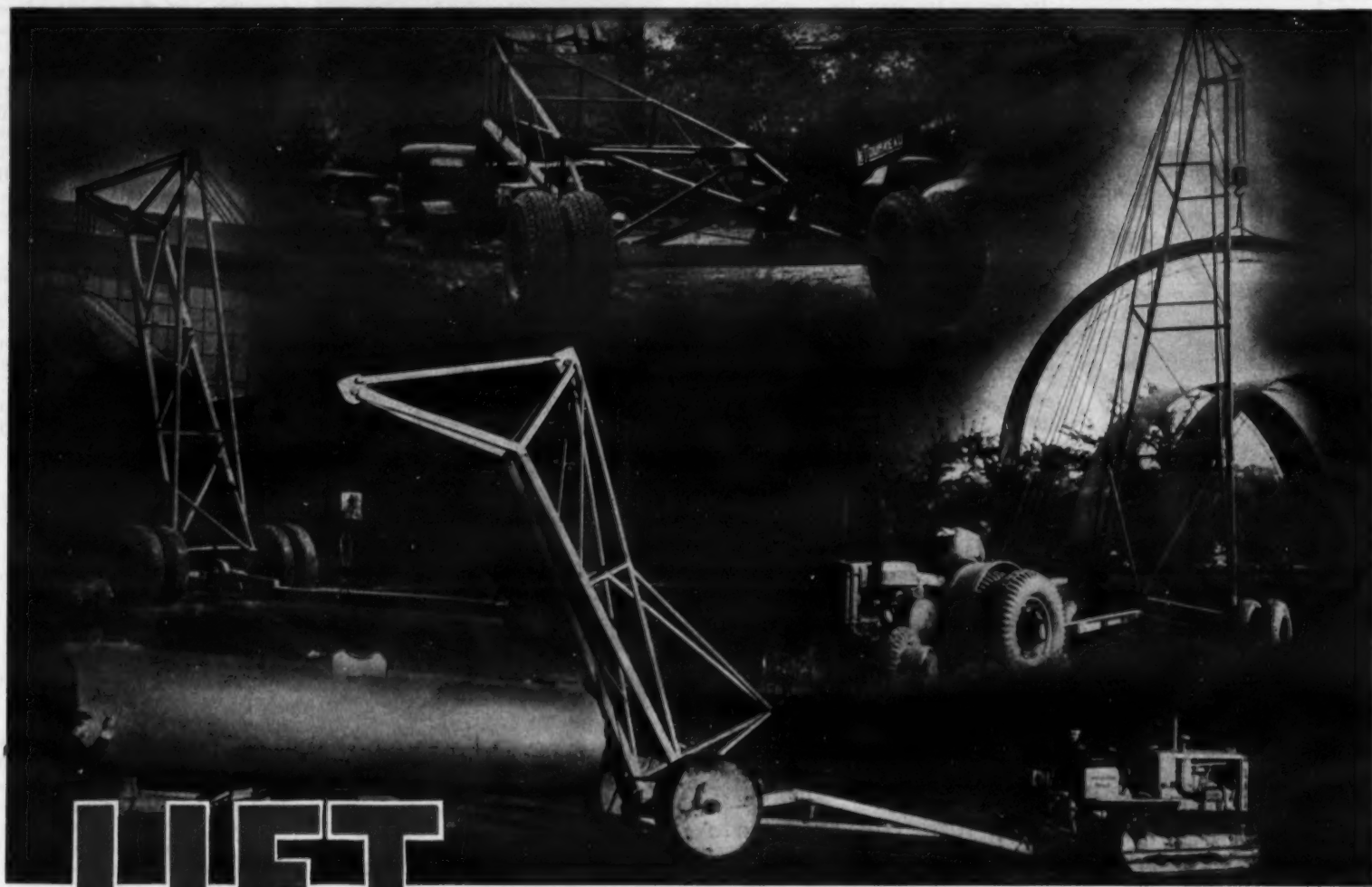
and a chart showing resistance of valves and fittings to flow of fluids. Recommendations of materials to be used in pumps handling various liquids, instructions for installing and operating different types of pumps, and much other material has been revised and brought up to date.

Copies of these Standards may be secured from the Secretary, Hydraulic Institute, 90 West St., New York City. Price: \$1.00.

Testing Apparatus For Road Materials

The increased interest in low-cost road construction has brought state and county highway laboratories to a position of greater importance in securing better results in the less expensive types of construction. Many new methods of testing have been developed, requiring simple but special equipment to secure accurate results.

A complete line of testing apparatus for highway materials, including asphalt, bitumen, creosote oil, cement, concrete, stone and subsoils, made by the Central Scientific Co., 1700 Irving Park Blvd., Lakeview Station, Chicago, Ill., for use by state and county highway laboratories, is described and illustrated in Catalog R-3 published by that company. Copies of this catalog may be secured gratis direct from the manufacturer.



LIFT YOUR LOADS WITH A LeTOURNEAU TRACTOR CRANE

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The mobility of the LeTourneau Tractor Crane gets it to jobs quickly; its ability to maneuver enables it to lift, move and place heavy, awkward loads in narrow quarters. Its line speed (50 to 400 feet per minute, depending on sheave reeving) and the accurate control possible through the LeTourneau Power Control Unit make for quick handling of all loads. Its long tongue makes a counterbalance of the tractor's weight, thus increases the Crane's leverage over the load and so greatly increases the load that can be handled. Stout, all-welded steel construction gives it a maximum of strength with light weight.

It can be quickly attached or detached from any tractor fitted with a double drum Power Control Unit... the same Power Control Unit that operates LeTourneau Carryall Scrapers, or a Bulldozer, and Rooter, Angledozer, etc.

Ask your "Caterpillar" tractor dealer to show you what the LeTourneau Crane can do for you.

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R. B. LETOURNEAU, INC., Stockton, California; Peoria, Illinois, Cable Address "Babblorau"

Treated Timber Used In Duval County, Fla.

Developments During Last 15 Years in Treated Timber Bridges for County Roads

By J. A. LONG, County Engineer,
Duval County, Florida

THE execution of a highway program in an area like Duval County is a continuous process, comparable in all essential respects to a state or nationwide program, except in scope. What we want in our highway improvements is: first, structural adequacy consistent with expected traffic requirements, and durability consistent with first cost and ultimate economy; second, flexibility to an extent that will permit changes in or additions to the structures as conditions may require, without complete reconstruction; and third, structural features in harmony with the contiguous highway facilities, and simple, pleasing lines, with variety carried only so far as to emphasize surroundings, not the structure.

Our recent activities in connection with composite timber-concrete bridge construction is an example of our attitude in this respect. It is not difficult to understand why we have utilized timber in a majority of our structures in the past. Timber of excellent quality, being a local product and available at low cost, has served our needs adequately and, we believe, to our best economic advantage.

During the past 15 years, the development of other materials and their application to low-cost structures and the growing scarcity and increased cost of such species of timber as cypress and the larger sizes of pine suitable for use untreated, together with the doctrine of permanent construction, have brought about important changes in design and construction types. More recently, however, with the development of timber preservation as a positive means of improving wood as a construction material, widening the scope of its usefulness, we find the pendulum swinging back, and we are giving a great deal more thought to timber construction and to methods and means of improving such structures in appearance, in structural integrity and in durability.

At present, we have in Duval County no less than 109 timber bridges which must be replaced within the next five or six years. With one or two exceptions, all of these are of untreated timber, which

because of their light capacity, narrow roadways and in some cases deterioration are either obsolete or unserviceable. There seems to be no reason why the majority of these may not be replaced with properly-designed structures of treated timber, meeting all our requirements.

Our first bridge of creosoted timber was constructed in 1921, just about the time that most of the states were beginning to use this material. It is interesting to note that when this bridge was removed last year because of changed traffic conditions, the material was found in excellent condition and was salvaged for use in other locations.

Between 1921 and 1929, both treated and untreated wood were used, the latter usually, when available in good grades of cypress and heart pine at reasonable cost. Since 1929, however, the use of untreated wood has virtually been abandoned, and preservative treatment has been applied in all cases of timber construction with design capacities of 15 tons, and in some cases, 10 tons.

Use for Drainage Structures

We believe preserved wood is adaptable for drainage structures. Hence in a large number of cases we have constructed box culverts with this material. We have developed culvert designs which have proved structurally adequate and economical and, after several years' service, have entailed no maintenance expense. We believe this to be a use for treated timber which can be materially enlarged. In fact, the box culvert is about the nearest approach we have to the ballasted-deck timber railway bridge which has broken all records from a service and durability standpoint.

Work Last Year

During the past year, we have constructed some half dozen bridges of the composite laminated timber-concrete type to serve on various important traffic arteries in Duval County. These bridges, ranging in length up to about 1,100 feet, in connection with several typical timber bridge structures and incidental improvements, were included in a PWA

project sponsored by Duval County, at a cost of approximately \$180,000.

From a paper presented before the American Wood-Preservers' Association Convention, January 1937.

In last minute legislation, the Delaware Assembly voted to borrow from highway funds, agreeing to repay the funds in the same fiscal year. If the funds are not repaid, the state is subject to the Federal-Aid diversion penalty.

HIGH CAPACITY 4" PUMP Self-Cleaning; high suction lift



Self-priming

- Open type trash impeller
- 4-cylinder engine
- Spring Mounted

FIG. 420

MARLOW PUMPS
RIDGEWOOD, N. J.

For TEN times more Diesel Service Hours- SINCLAIR TENOL

Would you like to operate your "Caterpillar" Diesel engines ten times longer between shutdowns, without stuck piston rings or heavy wear on cylinder liners? Then use Ten-ol, the new alloyed Diesel engine lubricant developed for "Caterpillar" Diesels by Sinclair.

Besides multiplying service hours between shutdowns by ten, Sinclair Ten-ol cuts your "Caterpillar" Diesel overhaul costs by 90%. Ten-ol is recommended by the Caterpillar Tractor Co. as a "new outstanding Diesel engine lubricant".

Order Sinclair Ten-ol, Sinclair Diesel Fuel and other Sinclair products from your local Sinclair office or write Sinclair Refining Company (Inc.), 630 Fifth Ave., New York City.

Sinclair Ten-ol lubricated this official "Caterpillar" Diesel test engine in a continuous 1000-hour accelerated wear test at the Sinclair Bureau of Standards. The above unretouched photograph shows engine taken down for inspection. Note perfect condition of rings and piston, and the cleanliness of the crankcase after draining. Compare with piston at right.

The finest grade of straight mineral oil was used to lubricate the above piston in a "Caterpillar" Diesel engine during a continuous acceleration test only 1/10 as long as the test described at left. Note in unretouched photo signs of blow-by indicating poor piston seal, carbon-coated piston crown, sludge, plugged oil control rings and gum on piston skirt.

FASTER DIGGING MULTIPLE-ROPE BUCKET.

The Williams Multiple-Rope Bucket has a double-hinge which not only allows for a longer stroke of the open bucket, but makes for a more rigid construction—greater digging power and speed.

Write for
bulletin

THE WELLMAN ENGINEERING CO.
7012 Central Avenue, Cleveland, Ohio

WILLIAMS
POWER ARM, POWER WHEEL, MULTIPLE-ROPE,
DRAGLINE *buckets*

Erosion Control Measures Will Be Used on Highways

Erosion control measures developed for farm lands will be used to protect sections of state and Federal-Aid highways this year under plans now being worked out by nineteen state highway departments, the Bureau of Public Roads and the Soil Conservation Service.

A recent survey in Wisconsin showed erosion responsible for much of the cost of highway maintenance in certain parts of the state. Uncontrolled soil erosion

also increases maintenance costs on Federal-Aid roads, according to officials of the Bureau of Public Roads.

Under the proposed program, state and federal officials will select short stretches of right-of-way along highways within the boundaries of Soil Conservation Service areas. The Service will furnish technical supervision, labor and necessary planting materials. The state will supply construction material and equipment, and agree to maintain the work for five years. Actual operations to protect highway cuts and fills, highway ditches, and drainage struc-

tures have been started in some of the states. Vegetative control measures will be used wherever possible, although some construction work will be done where gullies are menacing adjacent farm lands.

The states which have established roadside erosion control arrangements with the Soil Conservation Service are Alabama, Arizona, Arkansas, Georgia, Idaho, Illinois, Indiana, Maryland, Mississippi, North Carolina, Ohio, Oregon, South Carolina, Texas, Utah, Virginia, Washington, West Virginia and Wisconsin.

New Booklet on Buckets

A new well-illustrated booklet, describing Owen buckets and grapples, giving complete details of the features of their construction, with tables of ratings, dimensions and weights, and containing in addition data to aid in the selection of the right style and size of bucket for the job at hand, has been published by the Owen Bucket Co., 6030 Breakwater Ave., Cleveland, Ohio.

Copies of this booklet may be secured gratis direct from the Owen Bucket Co. by mentioning this magazine.

TAKE IT . . . TRY



ON THE SHORTER HAULS— TRACTOR AND SCRAPER

This big-capacity, heavy-duty combination of "Caterpillar" Diesel RD8 Tractor and LeTourneau Carryall Scraper brings lowest cost per yard on short hauls.

Minn. Counties Received \$87,000,000 from State

Counties in Minnesota have received back from the state more than \$87,000,000 in gas taxes, the one-mill tax and reimbursed county highway bonds since January 1, 1921 through the return to them of highway revenue of all kinds, according to a study recently completed by the Minnesota Highway Department. In the same 15-year period, the state has invested \$182,914,242 in its state trunk system which, with bonded indebtedness,

brings the investment up to between \$240,000,000 and \$250,000,000.

Records show that the one-mill tax, originated in 1921, has paid counties \$15,853,522 to December 31, 1936 for highway construction, \$11,190,743 for maintenance and \$833,161 for rural highway certificates. This money is used exclusively on state-aid secondary roads. During the same period, the state gas tax fund turned over \$25,502,307 to the counties. This money is used exclusively on so-called county-aid secondary roads and is set up by law.

Counties have also received large Fed-

eral grants direct for farm-to-market roads, grade crossing separations and other improvements, amounting to \$2,100,000 for roads in 1936 alone. This is in addition to the savings to the counties through maintenance of 4,500 miles of former county and secondary roads taken into state trunk system by legislative enactment.

New Ransome Dealers

In order to take care of rapidly increasing business and to offer better service to customers, the Ransome Con-

crete Machinery Co., Dunellen, N. J., has announced the appointment of the following firms to handle its line of concrete mixing and handling equipment: Brown-Strauss Corp., 1402 Guinotte Ave., Kansas City, Mo.; Shovel Supply Co., 1302 McKinney Ave., Dallas, Texas; Highway Equipment Co., 1359 Earnst St., Cincinnati, Ohio; Contractors Machinery & Supply Co., 200 E. Eleventh St., Chattanooga, Tenn.; Dakota Tractor & Equipment Co., 301 N. P. Ave., Fargo, N. D.; and H. B. Faith Equipment Co., 2724 Auburn St., Rockford, Ill.

IT ON

your job!

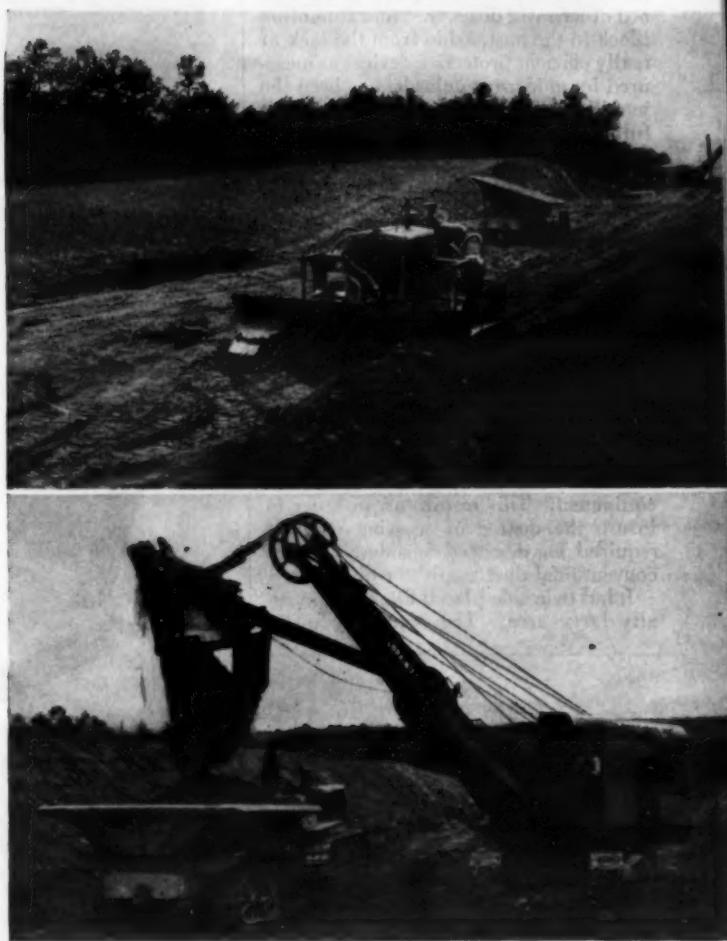
80,000 YARDS A MONTH

Chandler Bros., Inc., of Pinnacle, N. C., proved what the right equipment can do by putting a "Caterpillar" fleet to work on their highway contract in the North Carolina foothills. Four Diesel tractors, a Diesel-powered shovel, and a No. 66 grader moved and finished 280,000 yards at the rate of 80,000 yards a month. Twelve-hour-a-day operation—with two shifts—wasn't too much for the equipment and gave big results at low cost.

Much of their success was due to the careful choice of the right equipment for each type of work encountered. Your dealer can explain just how this affects costs and schedules—get in touch with him. Find out what it will mean to *your* jobs.

SHAPING THE FILL—TRACTOR AND ROADBUILDER. Chandler Bros. chose this "Caterpillar" Diesel Tractor and LaPlant-Choate Road-builder for spreading the material dumped by the wagons. Finishing was done with a "Caterpillar" No. 66 Grader—pulled by one of the Diesel tractors.

ON THE LONGER HAULS—TRACTOR AND WAGONS. Chandler Bros. used this "Caterpillar" Diesel-powered Lorain 77 Shovel, loading into Athey Cradle Dump Wagons pulled by "Caterpillar" Diesel Tractors for the kind of work this combination does best—on long hauls and where rock is met.



CATERPILLAR

REG. U.S. PAT. OFF.

TRACTOR CO. PEORIA, ILL.

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES,
TRACK-TYPE TRACTORS AND ROAD MACHINERY



The New CMC Wonder 3 1/2-S Mixer

Better Built Balance For New 3 1/2-S Mixers

Construction Machinery Co., Waterloo, Iowa, has announced its 1937 model of the Wonder 3 1/2-S standard tilting mixer. It is streamline in design and incorporates a number of features of interest to users. It has Timken bearings, balloon-tired disc wheels, an elliptic spring mounting, an alloy steel cone for the mixer, a 2 1/2-hp Stover engine, hinged engine house doors, a tool box within the engine box, an improved disappearing towing tongue and new abrasion-resisting mixing blades to speed action and to increase the life of the blades.

Respirators Aid Men In Dusty Operations

In the protection of workmen against the frequently occurring industrial hazard of harmful dusts, the chief stumbling block in the past, aside from the lack of really efficient protective devices as measured by modern standards, has been the inability of contractors to secure the full cooperation of the men themselves. Their objections have been based partly on a misplaced pride in their ability "to take it," but principally on the actual discomfort suffered in the use of the then available respirators because of the high breathing resistance, excessive weight, interference with vision and the necessity for frequent renewal of the filtering elements.

The new Comfo respirator developed by the Dust Research Laboratories of the Mine Safety Appliances Co., Pittsburgh, Pa., has been approved by the U. S. Bureau of Mines, the government testing laboratory for respiratory protective equipment. This respirator, in order to insure the degree of wearing comfort required, has departed considerably from conventional dust respirator design.

It has twin side-placed filters of unusually large area. The immediate effect

is to give better balance on the face along with unrestricted downward vision and to improve both the breathing resistance and the filtering efficiency due to the slower speed of travel of the respiratory air through the filtering mediums. These qualities are further improved by the designer's development of filter discs made from a cellulose material specially processed and treated. The complete filtering medium consists of a cellulose filter and a felt screen in each filter case, and is designed to protect the wearer against very fine dust particles.

Due to refinements in design and in choice of materials, the Comfo respirator weighs only a little over 5 ounces and may be completely sterilized. The position of the filters, as well as the head straps, assures non-interference with vision and working freedom and allows the wearing of spectacles, goggles, welding helmets or head coverings of any kind. The soft, flexible intumed edge of the face piece assures a comfortable fit and an air-tight seal.

Addition to Heil Co. Plant

Ground has already been broken for the construction of an addition to the Heil Co. factory in Milwaukee which will add 75,000 square feet of floor space to the present 400,000 square feet now occupied by the Heil plant. The expansion was necessitated by increased business in all departments but espe-

cially in the Hoist and Body Division. It is expected that the addition will be ready for manufacturing operations by June 1.

The building of this new addition is the fourth major expansion program in the history of the Heil Co. which was started by Julius P. Heil in 1901. The company also operates a plant at Hillsdale, N. J.

HIGHEST QUALITY LABOR SAVING ELECTRIC TOOLS

BY
SYNTRON

HAMMERS

For Drilling and
Cutting Concrete.
Magnet Type.
1/2" to 2" Capacities.

SAWS

For Cutting Lumber,
Brick, Tile, etc.
Heavy Duty Only.
2" to 4 1/4" Models.

DRILLS

For Rough Service
Drilling Metal &
Wood.
Heavy Duty Only.
1/4" to 1 1/4" Models.

VIBRATORS

For settling concrete.
Form type with
clamps.
Spud type for slabs.
Pulsating Magnets.

Write for our new 1937 Tool Catalogue

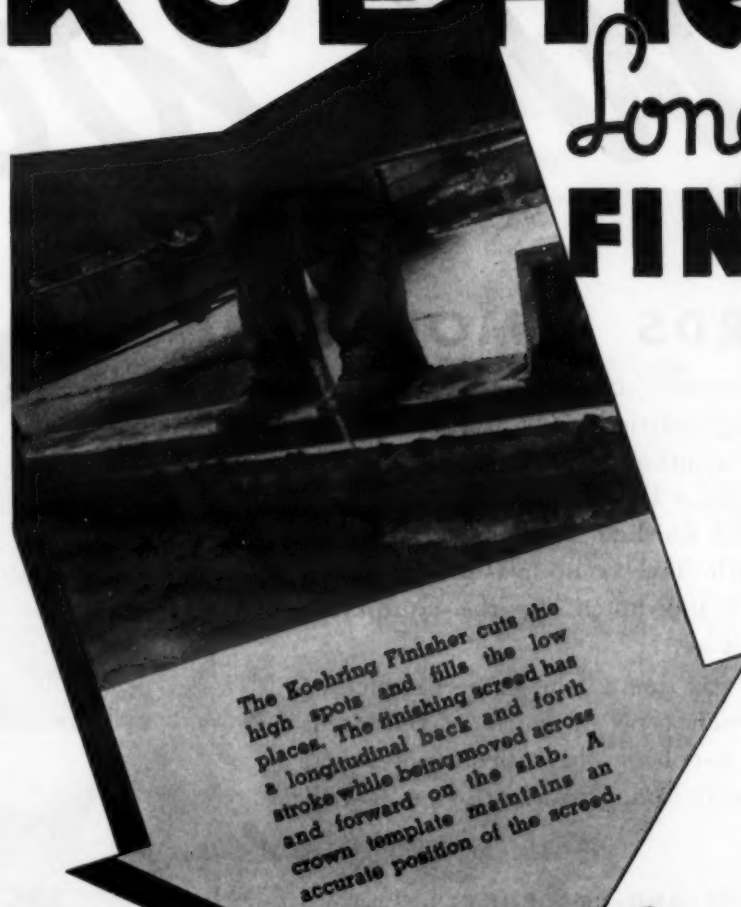
SYNTRON CO.

640 Lexington Ave.

PITTSBURGH, P.A.

KOEHRING

Longitudinal FINISHER



The Koehring Finisher cuts the high spots and fills the low places. The finishing screed has a longitudinal back and forth stroke while being moved across and forward on the slab. A crown template maintains an accurate position of the screed.

The Koehring Longitudinal Finisher is a new machine which, automatically and mechanically, assures a perfect finish for concrete highways. Smoother riding concrete highways are now possible, contractors need not correct surface inaccuracies by costly methods, and engineers have the assurance that surface specifications are mechanically accurate.

Write today for bulletin giving complete information.



KOEHRING COMPANY
Pavers - Mixers - Shovels - Cranes - Draglines - Dumpsters - Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

RUGGED

Dixon's Graphited Greases resist weather, dust-laden air, severest conditions. Insoluble in water.

DIXON'S CUP AND PRESSURE GUN GRAPHITED GREASES give maximum resistance to heat, cold, pressure, moisture. Available in all consistencies.

DIXON'S WATERPROOF GRAPHITED GREASE Superior adhesive lubricant - preservative for outdoor machinery, wire rope, chain, etc. Adheres at highest speeds.

At supply houses everywhere - or write Department R W148

JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.

AND WHAT A HELP THESE ARE

SEND FOR CIRCULARS

Better Roadsides

**New Book by J. M. Bennett
on the Development of the
Land Adjacent to Highways**

THE new book on the proper way of developing the marginal areas along the highways of our nation by J. M. Bennett, Superintendent of Parks and Forestry, Board of County Road Commissioners, Wayne County, Mich., contains a great deal of practical and helpful information for those who face this problem. The title "Roadsides, The Front Yard of the Nation," fits the case admirably, for it is Mr. Bennett's earnest endeavor to suggest the ways and means for making motoring throughout the country a more scenic and pleasurable affair.

Make Haste Slowly

"Roadside development is a public responsibility and while it embraces only one of the innumerable and more important public duties, it has a most glaring aspect. It is thrust before the users of all highways at all times and it is a subject that should interest, to a more or less degree, every individual in the nation . . . Although in many communities certain phases of roadside development could be accomplished much more rapidly than they actually are without waste and without the misuse of public funds, the work cannot proceed with safety faster than the necessity for it increases in the minds of the individual taxpayers . . . Many well-meaning individuals and organizations have stressed the beautiful at the expense of the practical and necessary . . . Appearance is highly important and fortunately proper appearing and attractive roadsides result largely from practical efforts to reduce maintenance costs . . . For example, sodding and seeding will eliminate much of the annual cost of filling washouts and cleaning drains, even considering the additional cost of mowing. The planting of trees and shrubs, however, seldom reduces maintenance costs but rather adds to them . . . Smooth, safe and shaded pavements, attractive roadsides which do not detract from the business of driving, ample space for resting and making minor repairs, and adequate comfort stations where relief may be found without trespass and without unsanitary conditions, aid all highways to function satisfactorily and economically."

These selected quotations from the first chapter indicate the need of roadside development. In succeeding chapters, Mr. Bennett discusses some of the objections to roadside development which have been raised by abutting property owners and then discusses tree planting, the place of the lowly shrub, the role of flowers in roadside development, the importance of ground cover and the question of the maintenance of nurseries by states and counties versus the use of commercial nursery stock or the use of native stock taken from uncultivated areas. The constant conflict with public utilities wishing to trim trees which interfere with wires and how this may be overcome are discussed in a very effective chapter. "Motoring in Comfort" is the title of a very pertinent discussion of comfort stations which should be maintained in a sanitary manner and preferably by the county or state. The question of signs including safety, route, intersection, geographical, interesting-site and advertising signs are discussed in a chapter "Timely and Untimely Signs."

The Practical Side

While some interested officials are liable to drift too much toward the thought of "beautification," Mr. Bennett keeps close to the very practical side of roadside development and in the

eleventh chapter, "The Ever Present Up-keep," he takes up the subject of annual maintenance. He says "The unattractive and useless appearance of neglected roadside plantings, even though the plans are practical and initial efforts modest, rightfully excite public sentiment against the work . . . If outside agencies are permitted to finance roadside planting, then they or the road authorities should provide sufficient funds annually thereafter for maintenance. Largely because this is seldom done and because the plans and ideas of others than the road officials nearly always fail to embrace the situation from a proper highway service standpoint, the practice of surrendering all or any part of the work to outsiders cannot be recommended. Not to plant is always better than to permit improper or neglected plantings to become public jokes."

The chapter on "Intrinsic Worth" seems to show value both material and intrinsic for roadside development. An-

other quotation summarizes Mr. Bennett's ideas; "The practical value of roadside development considered as a measure of its concrete or physical usefulness can in many instances be directly expressed in dollars and cents. Shaded highways are of untold value to motorists during the hot months of summer and at such times physical comfort is often of far more practical importance than the appearance of the landscape. In addition to their direct effect upon human beings, plants are also useful in maintaining the roadsides, roadbed and drainage structures in a proper condition." Other savings in money resulting from roadside development are indicated as not being due to planting alone but rather to control of such necessary evils as the poles and wires of public utilities.

Care of Trees, Shrubs, Grass

As a whole Mr. Bennett's book is a distinct contribution to the literature on roadside development. We have omitted discussion of its many pages devoted to

the care of trees and shrubs and sod, methods of seeding and the development of nurseries, all of which are discussed in painstaking detail. The book is published by the Stratford Co., Boston, Mass. Price \$3.00.

There are 48,000 communities in the United States whose only means of land transportation is the automobile, truck and bus.

WILLIAMS Form Clamps

Protect your Forms with Williams Design and Engineering Service.
A nail in the stud spaces the form.
Standard Equipment for Straight or Battened Walls—Tying Corners or Anchoring on 45°.
Least expensive High Tensile rods.
Wire for immediate shipment.

WILLIAMS FORM ENGINEERING CORP.
1244 Prospect Ave., S. E.
Grand Rapids, Mich.

HERE'S NEW PUMPING ECONOMY

A Complete Line of **REX** SPEED PRIME PUMPS

A new high in de-watering economy is reached by the positive, dependable operation of these new Rex Speed Prime Pumps . . . They have the new Rex Prime Control Valve that makes priming *completely automatic* and gives positive recirculation cut-off . . . The Patented Rex "Peeler" that insures greater air-handling ability. A recirculation tank with larger capacity and more cooling area—providing trouble-free operation . . . They are *fool-proof* in every sense of the word. With the new Rex Speed Primers it is entirely prac-

tical to start the motor and forget your pump! There are sizes to meet the needs of any job no matter what the gallonage—from the little 2"-7M to the big capacity 8"-125M . . . You have no water worries when you're working with Rex!

Send for our 1937 Rex Speed Prime Pump Bulletin!

CHAIN BELT COMPANY, 1666 W. Bruce Street, Milwaukee, Wis.



Laboratory-Controlled Road-Mix in Oregon

(Continued from page 1)

Passing 1½-inch square screen.....100 per cent
Retained on No. 10 sieve.....60-80 per cent
Retained on No. 200 sieve.....95-98 per cent
Passing No. 200 sieve.....2-5 per cent

Preparation of Base

The pit-run material was passed through a 1½-inch grizzly at the pit to remove all oversize material. A checker made repeated screen tests on the material and recorded any changes in grading which might occur. The material sheet was turned over to the laboratory representative at the end of each day's run and from these sieve tests, the quantity of cut-back was figured by a formula previously developed by the laboratory, and given to the state oil checker. The material was hauled to the road and spread in a uniform strip with a rock spreader, at the rate of 16.7 cubic yards per station. A state checker marked off the distances from stationing along the grade.

Applying the Asphalt

The RC-3 cut-back asphalt was shot at night, the 1,000-gallon distributor being preceded by a blade which cut approximately one-fifth from the windrow and laid it out 9 feet wide. A spring tooth harrow was dragged behind the distributor while it was applying the asphalt, the first shot being about one-fifth of the total amount required. This process of spreading out the windrow, shooting the asphalt, and harrowing was repeated until the estimated total amount of asphalt had been applied. The blade then threw the impregnated material into a windrow. This operation, begun at night, was generally finished about 6 a.m.

The tractor with pull blades and the graders started mixing about 8 a.m. and some time between noon and 4 p.m., the material was ready to lay out. The equipment used for mixing consisted of one Caterpillar Seventy-Five pulling a 12-foot blade, one Caterpillar Fifty pulling a 10-foot blade, and two Austin 77 patrols. The layout was spread to crown and grade by the patrols, and usually was completed by 4 p.m.

A 10-ton three-wheeled roller compacted the day's run, then finished rolling the section the next morning during the mixing time. A seal coat consisting of a shot of RC-3 at the rate of 0.2 gal-

lon per square yard was applied to the entire surface of the road-mix and covered with pit material screened ½ inch minus.

The contractor averaged 5,832 linear feet a day on this 16-mile stretch, the shortest day's run being 4,600 feet and the longest, 7,450 feet. The maximum haul for asphalt was about 50 miles and for aggregate about 14 miles.

Time-Saver Scales and Tables For Concrete Joist Spacing

A set of twelve concrete joist and rod spacing scales with design tables, of interest to architects and concrete designing engineers because of the time-saving features which these scales and tables include, has just been announced by the Universal Atlas Cement Co.

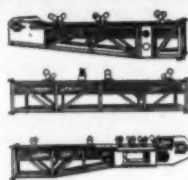
All of the standard spacings for joists cast in place over 20 and 30-inch wide steel forms are found in the tables; a 16-inch spacing is included for a 4-inch wide joist with which 4, 6 and 8-inch

depths of 12-inch clay tile can be used as fillers between joists; and four standard scales are provided for use with precast concrete joists. Scales are also included for rod spacings in solid concrete slab construction.

Sets of these "Concrete Joist Spacing

Scales and Design Tables" may be secured gratis by contractors and engineers direct from the Universal Atlas Cement Co., 208 So. LaSalle St., Chicago, Ill., by writing on their business stationery and mentioning this magazine.

NEW WAYS TO CUT MATERIALS HANDLING COSTS



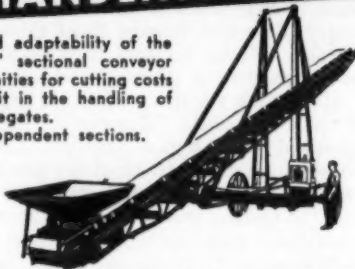
The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.

Made up of independent sections.

Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor.

Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.

PORTABLE MACHINERY CO., York, Pa.; Clifton, N. J.; Chicago, Ill.



YOU CAN'T PUMP A GALLON OF WATER WITH *PAPER HORSEPOWER*



North Street Pumping Station, illuminated aerator and reservoir, Waukesha, Wisconsin.

IN AN EMERGENCY YOU NEED *REAL HORSEPOWER!*

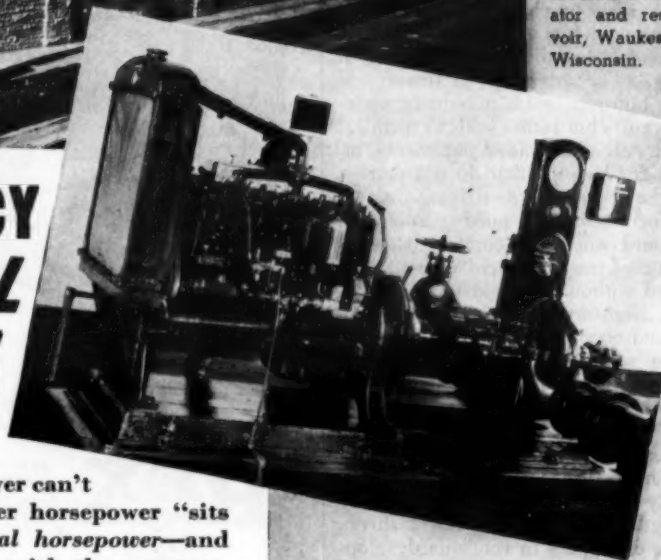
When a city needs water—in an emergency—the pumps' demand for power can't be met with just a rating curve. Paper horsepower "sits down" on the job. You must have *real horsepower*—and there is no surer way of getting it than with the *conservatively-rated Waukesha Engines*.

For fires and other emergencies, the city water works of Waukesha, Wisconsin, has a stand-by high service *American* pump, powered by a 125-hp., 6-cyl., 4½ x 5½ Waukesha Hy-Powr Engine, which delivers 1100 g.p.m. at a 180-ft. head. This brings the available water supply for fire purposes well above the National Underwriters' requirements. In case all other power was shut off, this stand-by would supply this city of 17,000 people with water for five hours.

During the excessive hot weather of last year, July 7-13, 1936 . . . when the stand-by operated 2½ hours daily because of increased demands for water . . . the Waukesha Hy-Powr Engine effectively demonstrated its ability to meet every demand for power, driving the pump up to its full-rated capacity with ease.

Why Waukesha Hy-Powr Engines actually deliver 20 to 30 per cent *more power* than conventional engines of the same displacement, burning either gas or gasoline, is told in Bulletin 899. Write for it.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN



A 125-hp., 6-cyl. Waukesha Hy-Powr Engine powers the stand-by pump which delivers 1100 g.p.m. at a 180-ft. head.

BUYING A PUMP?



INSIST ON:

- Faster, 100% Automatic Priming,
- Greater Efficiency in Any Size, at Any Lift,
- Thousands of Hours of Heavy Duty Service.
- Cut Your Costs with "Sure Prime" Pumps—2" to 10" Sizes, Capacities 7000 to 300,000 G. P. H. Send for New Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

WAUKESHA
ENGINES

Maintenance Station Like Movie Mansion

Highway Unit on Coast
Near Malibu Beach Has
Buildings Designed in
Harmony with Location

(Photos on page 56)

DRIVING south from Oxnard, Calif., on the Coastal Highway, U. S. 101-Alternate, toward Los Angeles, a distance of about 56 miles, one passes magnificent cliffs, dashing breakers, the Malibu Beach movie star colony, the late Thelma Todd's restaurant and other interesting sights.

"What other interesting sights?" inquires the movie-minded reader, sensing a snappy story. This story is about an attractive cottage we spied above the road about 16 miles southeast of Oxnard, and not far from Malibu Beach. The well-landscaped stucco cottage might well have been the shore home of a movie star, but on driving closer we found it to be the cottage of the foreman of the local highway maintenance crew as, at the southerly end of the lot, appeared the identifying sign, "Division of Highways, District VII, Big Sycamore Maintenance Station." This area along the coast has a high residential value and it was only through the agreement of the Division of Highways to use a type of construction which would not impair values of adjacent properties that the Division was able to secure this land for the foreman's cottage, garage, pump house and water tank.

The 0.89-acre site was purchased in 1929 by condemnation for \$4,509.64 with various legal expenses through January, 1931, amounting to \$1,000. The improvements in the property from 1929 through 1931 amounted to \$14,795.27 and are shown in detail in the following table.

Description	Year	Cost
Clearing and grading	1929-30	\$ 1,487.18
Complete grading	1931	117.69
Fence, 800 feet woven wire	1930	994.96
110-volt electric lighting plant	1931	566.64
Myers pump and 2-hp electric motor	1931	332.00
11x12-foot Spanish type pump house	1931	288.75
Lawn sprinkling system	1931	290.40
52-foot 10-inch x 24-foot 4-inch, 5-room stucco cottage	1931	5,048.00
12-foot x 14-foot 8-inch stucco oil house	1931	481.60
38-foot x 76-foot stucco garage and bunk house	1931	4,569.60
Septic tank	1931	180.50
Pipe lines	1930	212.50
Concrete tower and G.I. tanks	1930	115.45
Well	1930	110.00
		\$14,795.27

Hercules Power for Drills

The light-weight No. 12 core drill made by the Sullivan Machinery Co., is powered by a Model ZXB Hercules power unit. This drill is designed for taking cores to test foundations for dams, bridge abutments, and similar work. The engine used, made by the Hercules Motors Corp., Canton, Ohio, is a high-speed heavy-duty model which has made possible unusual time reductions in drilling operations, according to the manufacturer.

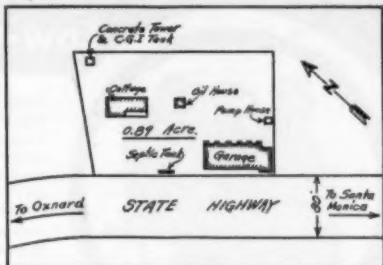
GIANTGRIP^T Straightedge and Scraper in One

Two usable edges:—

1. a rounded edge, for line point straightening
2. an edge sharp-cornered and squared, for scraping

Weight only 11½ lbs., yet very strong
Write for Price List No. 8

L & M Manufacturing Co.
Division of Mondie Forge Co., Inc.
10302 Berea Road, Cleveland



Plan of the Big Sycamore Maintenance Station in California

Standard Policy

It is the policy of the Division of Highways to adapt the standard plans for these maintenance stations to the community in which they are located,

whether it be desert, mountain, or sea shore. Many of the recent structures have been built with WPA labor and all are landscaped to make them attractive.

The structures are built for a life of 25 years and the maintenance calls for painting every three years. The cottage or cottages are rented to the foreman and laborers on this basis, providing economical housing for these important maintenance units.

Construction Statistics

Released by Census Bureau

Volume II of the Census of Business series for the Construction Industry has been published by the Bureau of the Census, Department of Commerce. Figures in considerable detail, by kind of contracting business, and by states, cities and geographical divisions, show employment by months and by occupational classes. Fluctuations in employment in the industry are measured by

the number of employees, number of wage earners at the site of construction, pay rolls, and number of man-hours, all shown by months.

Copies of this report are available in limited quantities upon request to the Bureau of the Census, Department of Commerce, Washington, D. C.

**Concrete VIBRATORS
AND GRINDERS**

Write for Circular on types, sizes and prices

White Mfg. Co.
ELKHART INDIANA

NOW...
38 JOBS show the **3/4 Yd.**
Lorain-40 Averages **89 Yds.**
per hr.

• Startling performance figures on the L-40 continue to roll

in. Six months ago a summary based on 25 jobs showed this machine had averaged 85 yds. per hour. Now it's 38* jobs for an average of 89 yds. per hour! Records such as these leave no doubt concerning the L-40's ability to produce big yardage, even though it weighs and costs but little more than most ½-yd. units. If you are looking for a machine of proved performance, by all means investigate the L-40. It's the year's biggest shovel value.

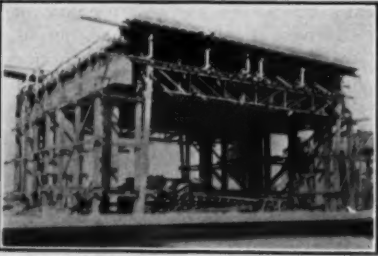
* There is a detailed report in the Universal files on each of these 38 shovel and dragline jobs. Complete data and photographs on 20 of this number have been assembled into an interesting booklet. Write for it today.



LORAINS
MOVE MORE MATERIAL, FASTER AT LOWER COST

CU.
3/8 to 2
YD.

The Universal Crane Co., Lorain, Ohio



C. & E. M. Photo
East View of One Bay, Showing Steel Falsework Trusses in Place and Clear Ground Beneath

Unusual Methods Used On Calwa Overpass

(Continued from page 2)

the edges. The long plank was held to a perfect plane by adjustments at every 4-foot panel point of the duralumin truss that carried the plank. With the screw adjustments it was possible to make a 2-inch vertical curve in a 40-foot span. As duralumin cannot be welded, the entire truss was riveted. The weight of the screed was about evenly divided between the plank and the truss and it was handled by two men at each end although it can be moved by one man at each end.

When in use to insure a smooth riding bridge deck the screed was operated by the four men, first as a screed cutting the high spots in the concrete, then to tamp the entire width of the span to knock any of the large aggregate into the concrete and finally as a longitudinal float leaving a herringbone pattern on the surface.

An Aluminum Drain Hole Form

Wooden blocks carefully shaped to give a smooth surface to the drain-holes on a bridge structure are difficult to make. They are really cabinet-makers' work but have to be done by the regular carpenters with the result that frequently they are difficult to remove. This may cause spalling of the concrete at the sides of the drain by the hammering of the form to remove it. This does not describe the work on the R. R. Bishop job on the Calwa overpass for he had made a number of aluminum forms that conformed exactly to the flared section of the drain. A 1/2-inch bolt welded to the inside of the form, which was about 6 inches square, made it possible to bolt the form to the curb header, using a washer and wing nut. At first the aluminum forms were oiled but it was found unnecessary as a slight pull on the bolt dislodged them readily from the concrete.

Personnel

R. B. Wood was Superintendent for R. R. Bishop, of Long Beach, Calif., contractor for this overpass. The Resident Engineer for the Bridge Department of the Division of Highways was M. E. Whitney.

Extensive construction activities are being carried on by the Finnish Government and the communes, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. The amount for road and bridge construction in the 1937 budget is 94,998,500 marks, or about \$1,899,970.

Testing Apparatus for State, County Hwy. Laboratories

Complete testing apparatus for asphalt, oil and cement for use in state and county highway department laboratories for the control of materials used in road construction and maintenance is described and illustrated in catalogs of Eimer & Amend, Third Ave. at 18th St., New York City.

Copies of this literature may be secured free by state and county highway engineers by mentioning this magazine.

Aeroil Service Broadened, New Traffic Equipment Div.

The Aeroil Burner Co., Park Ave. at 13th St., West New York, N.J., manufacturer of asphalt heating equipment for contractors and highway departments, has recently added a Traffic Equipment Division. This Division,

managed by Pierre W. Giannini, formerly of the Traffic Equipment Corp., will sell reflective devices, signs, stan-

chions, signals, traffic line paint, flashing signals and the well-known Reflectstrip.

HERE'S TROUBLE-FREE Low-Cost Water-Moving!



You have no water worries when you're working with a Rex Speed Prime Pump. It handles larger solids—automatically re-primed—will keep on pumping when flow and seepage stop—pumps more gallons per day at lower cost. Sizes, 2"-7M to 8"-125M, on all types of mountings that enable you to spot them "close to the hole." With them it is entirely practical to start the motor and forget your pump. Send for our 1937 Speed Prime Pump Bulletin!

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1666 West Bruce Street, Milwaukee, Wisconsin

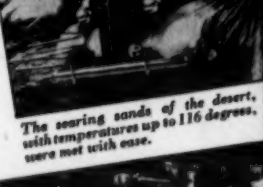
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CHAIN BELT COMPANY OF MILWAUKEE
CONSTRUCTION EQUIPMENT

Here's Proof of record economy-record dependability



Over high peaks in high gear the truck went forward, never faltering.



CHEVROLET "ECONOMY MODEL" TRUCK

hauls certified 1000-pound load

10,244 MILES

at cost of less than

1¢ PER MILE for gas



Study this

Unequaled record—then buy CHEVROLET TRUCKS

Location of Test.....Round the Nation
—Detroit to Detroit
Distance Traveled.....10,244.9 Miles
Gasoline Used.....493.8 Gallons
Oil Consumed.....7.5 Quarts
Water Used.....1 Quart
Gasoline Cost.....\$101.00
Gasoline Mileage.....29.74 Miles per Gallon
Average Speed.....31.18 Miles per Hour
Running Time.....328 Hours, 31 Minutes
Gasoline Cost per Mile.....\$.0098
Average Oil Mileage.....1,365.9 Miles per Qt.
Total Cost of Repair Parts.....\$.73

These records have been certified by the A. A. A. Council Board as being officially correct.

Here, in these amazing facts and figures, is definite proof that Chevrolet trucks are the best trucks for you! . . . See your nearest Chevrolet dealer today, and buy Chevrolet trucks for more power per gallon, lower cost per load—for maximum dependability and maximum all-round economy.

CHEVROLET MOTOR DIVISION
General Motors Sales Corporation
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General Motors Installment Plan—monthly payments to suit your purse.

FOR ECONOMICAL TRANSPORTATION

SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy, guaranteed.

SAND'S LEVEL & TOOL CO.
9631 Gratiot Ave. Detroit, Mich.

"MORE POWER per gallon LOWER COST per load"



"Yes Sir, That's My Baby" Sings Jack Haile, Gen. Mgr., Road Machinery Div., Gar Wood Industries, Inc., of the Miniature Gar Wood Hydraulic Scraper Now on Nation-Wide Tour

Midget Scraper on Tour

Midgets on tour seem to belong with that feeling of spring in the air, circus posters on the fences and thoughts of peanuts and elephants and red lemonade. The midget shown in the accompanying illustration is not of the circus type, but is a miniature operating model of the Gar Wood scraper which is making a nation-wide tour to demonstrate to dealers of track-type tractors how this hydraulically-operated machine made by Gar Wood Industries, Inc., Road Machinery Div., 7924 Riopelle St., Detroit, Mich., digs and loads, lifts and hauls, dumps and spreads material automatically.

This midget can do in a small way everything which the full-size scraper can do and is an exact replica of the larger machine, which weighs approximately 12,000 pounds and is almost 20 feet in length. More than 4,000 blueprint dimensions had to be re-scaled to make the 5-foot quarter-size model. It is believed that this Gar Wood miniature, with its small set of hydraulic hoists, is the first of its kind ever exhibited.

New Heavy-Duty Trucks

Augmenting its established line of motor trucks, six new conventional trucks and four cab-over-engine trucks, all especially designed for heavy-duty service, have been announced by the Federal Motor Truck Co., Detroit, Mich. These new Federal trucks are constructed for the extremely severe truck service that is likely to stretch the factor of safety of the standard truck to the limit.

The six oversize models include Model 15H, with 1½ to 3-ton rating; Model 18H, 2 to 3½-ton rating; 20H, 2 to 4-ton rating; 25H, 2½ to 4½-ton rating; 29H, 3 to 5-ton rating; and C8H, 7½-ton rating. The cab-over-engine models include the 75H, with a 1½ to 3-ton rating; 80H, 2 to 4-ton rating; 85H, 2½ to 4½-ton rating; and 89H, 3 to 5-ton rating.

In announcing the new H series, the Federal Motor Truck Co. states that these trucks will be manufactured, not with the idea of carrying more payload than the standard models, but of carrying the same load better. Due to the

heavier and stronger rear axle and other units with which each truck is equipped, the margin of safety is increased and the danger of failure lessened.

The chassis weight has been increased from 300 to 400 pounds and larger rear axles, rear springs, rear brakes, universal joints and tire equipment constitute the chief changes in these oversize models.

Linde Opens New Plants

The Linde Air Products Co., a unit of the Union Carbide & Carbon Corp., has announced the opening of a new Linde oxygen plant at Essington, Penna., near Philadelphia, to take care of the increasing oxygen requirements in that area.

A new Prest-O-Lite acetylene plant at Norfolk, Va., has also been opened recently to take care of the acetylene requirements in that area. A stock of calcium carbide will also be maintained at this plant.

A New Style Kettle For Heating Tar, Asphalt

A new tar and asphalt heating kettle, with a rated capacity of 300 gallons and an actual capacity of 350 gallons, has just been announced by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio. Similar to the Littleford No. 84-HD model, this new kettle has double-heat

circulation and a screened reservoir, and has been designed to avoid unnecessary weight, a feature of interest to road maintenance crews of state and county highway departments.

The unit measures 135 inches x 70 inches, with a loading height of 59 inches above the ground, has 12-leaf semi-elliptic springs, Timken roller bearings, 32 x 6 10-ply single pneumatic tires and weighs 2,250 pounds.

"THERE'S A REASON"

Why is it that in States where "FLEX-PLANE" joints are used you find better roads?

There's a reason—let us tell you why, also why you should use "FLEX-PLANE" finishing machines with a wide screed.

Flexible Road Joint Machine Company
WARREN, OHIO



A VERTICAL DROP

or a

GRADUAL DESCENT...

Which Saves the Surface?

DROPPING stones vertically from a cliff will soon destroy the surface where they hit — but rolling the stones down an embankment causes only a slightly gradual wear. The same is true of aggregates in a concrete mixer.

Smith Tilters are known for their easy rolling mixing action. The aggregates are carried up only a short distance and then rolled back on to the top of the batch. Destructive dropping of materials from the top to the bottom of the drum is eliminated. The easy rolling action does away with the greatest cause of wear in a concrete

mixer — prolongs the life of the mixer — cuts down maintenance costs.

To reduce the cost of concrete, engineers often specify large stones in the mix. The tilting mixer is the only concrete mixer which can and regularly does handle large aggregate successfully without undue damage to the machine and without segregation during discharge. No wonder Smith Mixers are specified for pouring the world's largest concrete jobs — Boulder Dam, Tygart Valley Reservoir, Norris Dam, Muscle Shoals, and many others.



Smith Double Cone Drum with famous End-to-Center mixing action. The batch is always balanced at center of drum.

Get the complete Smith Tilter story. Write for a copy of Catalog No. 160. THE T. L. SMITH COMPANY 2857 N. 32nd Street, Milwaukee, Wis.

SMITH MIXERS

THE BOULDER DAM MIXERS

3856 CONTRACTORS ARE USING "ANCHOR" PULLER JACKS



THERE MUST BE GOOD REASONS 3856 MEN CAN'T BE WRONG

Comes in handy on dozens of odd jobs. Capacity 3 tons single line; 5 tons two-line. Sheave block \$4.00 extra if desired.

MADE BY
EDELBLUTE MANUFACTURING CO.
REYNOLDSVILLE, PENNA.



Tack Welding the Trusses to the Floor Stringers on the Golden Gate Bridge Which Will Be Opened This Month

Over 500,000 Tack Welds On Golden Gate Bridge

The Golden Gate Bridge across the entrance to San Francisco Bay, which will be opened this month, has been the site of one of the largest shop and field welding operations on the Pacific Coast. This job, which covered the fabrication of steel fabric trusses and the welding of these trusses to floor stringers on the bridge, was handled by twelve P & H Hansen Smootharc welders.

The Concrete Engineering Co., which received the contract to fabricate, deliver and place these trusses in the bridge, divided its field of welding activity into two distinct operations. Operation A included all of the shop work entailed in fabricating approximately 1,800 tons of welded trusses. About six months' time was required for this work which was done by six 300-ampere motor-driven portable Hansen welders, working in three shifts.

Operation B which included all the field work covered the tack welding of these trusses to floor stringers in the bridge. The trusses have a depth of approximately 5 inches and are spaced on 6-inch centers. Over half a million 1-inch tack welds were required during a period of about 75 days. These tack welding operations were carried on by six more of the same type of Hansen welders.

Welding Service Sales, Inc., of San Francisco, had the contract for furnishing all equipment, electrodes and sup-

plies, and also for doing the tack welding in the field.

New Portable Conveyor

A light, sturdy, easily portable conveyor, known as the Atlas high-speed portable conveyor, has recently been announced by the Atlas Conveyor Co., Clintonville, Wis. This new contractors' unit is 24 feet long, and is equipped with a Stover 3 to 5-hp two-cylinder radiator-cooled engine mounted above the frame. Equipped with high-pressure pneumatic truck tires, the conveyor can easily be towed behind a truck at high speed, providing rapid transfer from one job to another.

This new conveyor is made in only one length and belt width, 24 feet long with a 16-inch belt width, and a capacity of 25 to 90 tons an hour, depending on the material handled and loading conditions. Special lengths and belt widths are made to order. The discharging height is 11 feet maximum

and the charging height, 13 inches. The belt is 4-ply, rubber-covered, with an $\frac{1}{8}$ -inch cover on the carrying side, and fitted with $1\frac{1}{2}$ x $4\frac{1}{2}$ -inch steel angle cleats. The skirt boards are of steel, the full length of the conveyor, with rubber flashings. The head and foot pulleys are all-steel and machine crowned, the head being 11 x 18 inches and the foot, 6 x 18 inches.

The take-ups are at the loading end, with 8-inch adjusting screws. A head pulley adjustment facilitates easy belt alignment. The drive is a chain and sprocket device, equipped with an adjustable chain tightener.

The unit is available with electric power instead of the gasoline motor, if desired, the electric motor being mounted on top or underneath the frame.



Save TIME-MONEY-LIVES with a MICHIGAN Special HIGHWAY SPREADER!

With truck, driver and one operator standing at the back, this sturdy sanding device spreads 12-20 miles of road per hour, any desired width from 10 to 30 feet. The savings effected justify purchasing at the present low price!

Write for circular

The Benedict Manufacturing Co.
Big Rapids, Michigan

Territory Open for New Distributors



Truck buyers in the Construction Industry and in every other industry are inspecting, comparing and then selecting GMC trucks. And for very convincing reasons! Consider the extra value in the GMC 2-3 ton range, for instance. Available in either conventional or cab-over-engine types, these big, rugged GMC's have such desirable features as advanced stream-style with exclusive "dual-tone" color design, roomy, comfortable, all-steel "Helmet-Top" cabs, increased load space, safe, sure GMR hydraulic brakes of improved design, stabilized front end, protective full-pressure

engine lubrication, extra rugged full-floating rear axle and dozens of other important advantages that definitely assure improved performance, greater dependability and increased economy . . . You, too, are urged to see GMC for quality at low cost—the 2-3 ton type or any other size from $\frac{1}{2}$ to 12 tons that fits your needs. All are priced low on any basis of comparison. All are exceptional values.

QUALITY AT PRICES LOWER THAN AVERAGE

Time payments through our own Y. M. A. C. Plan at lowest available rates

GENERAL MOTORS TRUCKS & TRAILERS

GENERAL MOTORS TRUCK & COACH

DIVISION OF

YELLOW TRUCK & COACH MANUFACTURING COMPANY, PONTIAC, MICHIGAN

LAYING BLACK TOP?



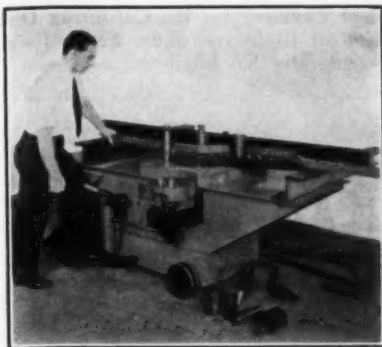
JAEGER PAVER has 10 ADVANTAGES:

- 18 Ft. Movable Forms Give Smoothness of Concrete,
- 50% More Traction,
- No Load on New Material,
- Adjustable 9 to 14 Ft. Widths,
- Blends Perfect Joints,
- Capacity to 1000 Tons a Day,
- Lays Hot or Cold Bituminous, Stone or Macadam,
- Pug Mill Spreader,
- Less Hand Finishing,
- Automotive Construction,

Write for New Catalog, Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER



The New G. D. S. Bar Bender

New Power-Operated Bender For Reinforcing Bars

The new G. D. S. automatic bar bender, made by the G. D. S. Shearing & Punching Machine Co., 101 Walker St., New York City, is equipped with an automatic dial plate on which any bending required can be pegged, causing the machine to stop automatically and return to the starting point when the bending is completed. This arrangement assures uniformity in the bendings and accelerates production.

With the special equipment Nos. 1, 2, 3 and 4, which are really part of the bender, all the different types of bendings ordinarily required in connection with reinforcing bars can be made. The new type Special Equipment No. 1 is designed for the bending of hooks and angles on truss bars. It bends both hooks and angles on one or more bars at the same time; bends two angles in one operation; makes alternate right and left bendings of angles, always two angles in one operation; and the bars always move across the machine in one direction, without having to be reversed. The other special equipment makes it possible to bend spirals, rings, etc. of any diameter and gradation, stirrups, etc.

This bender comes in four sizes, Nos. 32, 40, 50 and 60. No. 30 requires a 2-hp motor and Nos. 40 and 50, a 5-hp motor.

Proposed St.-Gothard Tunnel For Automobile Traffic

There is still considerable discussion in France about the possible construction of a tunnel through Saint-Gothard Mountain for automobile traffic across or under the Alps, according to a recent report from the U. S. Bureau of Foreign and Domestic Commerce. The construction of such a tunnel, or of one under Mount Blanc, which is also being discussed, would make possible motor travel from Paris to Milan during the winter months, which is now impossible because of the heavy snows in the mountain passes. The project would also be of military value and, during its construction, would relieve the unemployment situation somewhat, as it is estimated that it would furnish employment for 5,000 men for five years.

However, the excessive cost of this project has caused some hesitation, it being estimated that an expenditure of about \$33,000,000 would be necessary to construct the tunnel under Saint-Gothard, or about \$503 per foot, compared to \$372 per foot for the new sub-aqueous East River tunnel in New York City. In order to recover expenses on the French rock tunnel it would be necessary to charge a toll of \$6.60 per car during its first year of operation. While this seems exorbitant to us, it is not so much when compared to the fact that now tourists wishing to drive to Italy in winter have to put their automobiles on freight cars and have them taken through the Simplon railroad tunnel. It is estimated that in the first year, 106,500 vehicles would use the tunnel and that in 10 years this number would increase to about 320,000.

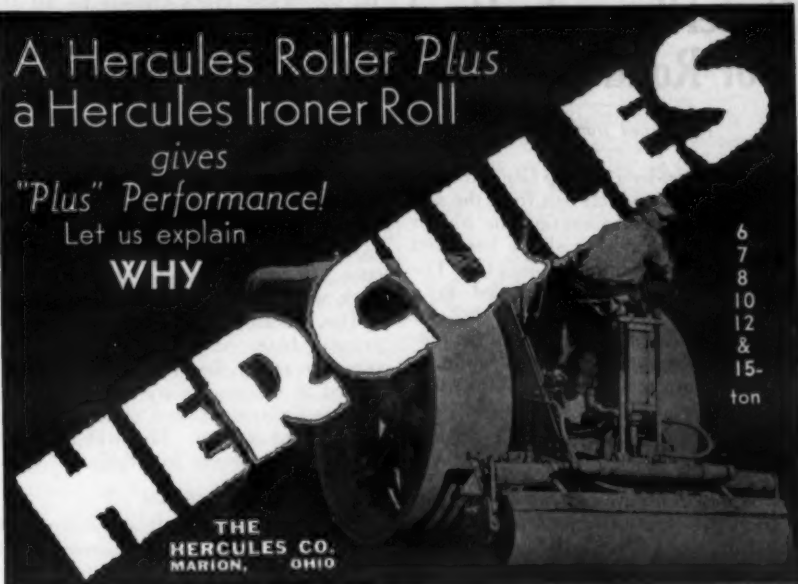
Another solution, proposed by French engineers, which would entail much less expense, is to equip the two roads running along the Simplon railroad tunnel for road traffic.

A Hercules Roller *Plus*
a Hercules Ironer Roll

gives
"Plus" Performance!

Let us explain

WHY

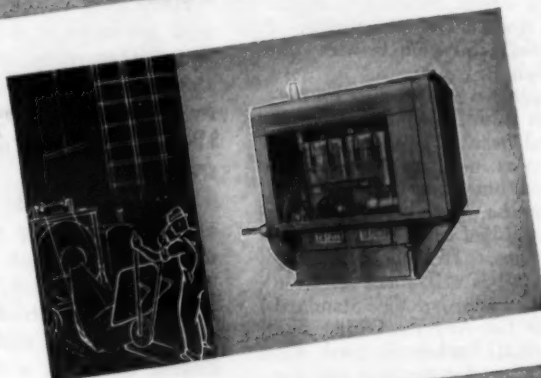


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THE RECOGNIZED STANDARD
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Dependable POWER

LeRoi Engines, 4 to 400 H.P., the choice of the construction industry for tried, tested, and proved power on all types of equipment. Designed by capable engineers and built by experienced, skilled mechanics with precision machinery in a modern plant to standards which assure dependability, low operating costs, and long service life.



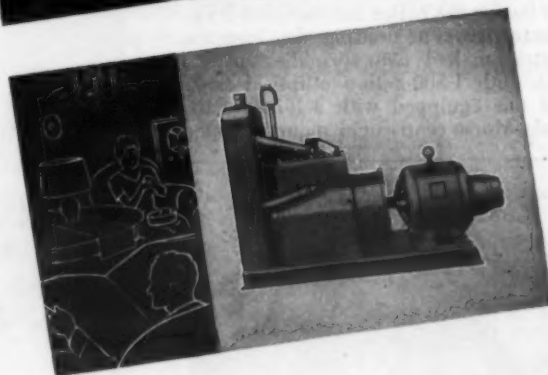
Economical... AIR

LeRoi-Rix Air Compressors are available in single or two stage, portable or stationary, all mountings . . . known for their capacity to provide cooler air and more air. Engine and compressor are both built in the LeRoi plant . . . to LeRoi's high standards of construction including spring mounting and other important features. Owners usually repeat on their original purchase of LeRoi-Rix Air Compressors.



Reliable... LIGHT

LeRoi direct connected Lighting Plants . . . 1½ to 200 K.W., DC or AC, any size, voltage, or type . . . for continuous duty or stand-by service. Noted for silent, smooth operation . . . conservative speeds . . . long service life. Thousands in service on important construction projects and stand-by duty in power plants.



Write to LeRoi Company, Milwaukee, Wisconsin, for recommendations, specifications, and prices when your need is for dependable power, economical air, or reliable light.

LE ROI COMPANY, MILWAUKEE, WIS.



**VIBRATING SCREEDS
VIBRATING ROLLERS**
For Concrete Pavements

Immersion Type Vibrators
Flexible Shaft Drives
Gas and Electric—All Sizes

ONE-MAN PORTABLE VIBRATOR
"THE WOLLOPER"
Internal or Surface Type
Weight 65 lbs., complete

**BAILY
VIBRATOR CO.**
1828 Wood St.
PHILADELPHIA,
PA.



Novel Spreader Used For Road Widening

(Continued from page 5)

crusher driven by a 100-hp General Electric motor. A 30-inch belt from the secondary crusher also carried the binder material when running slurry base and the filler when running hot-mix top. The screened material was delivered to a 65-yard bin.

When running the hot-mix top the material was dropped through a chute to a 5 x 20-foot Standard Steel Works oil-fired dryer and then to the hot elevator. When running the slurry base, the 30-inch 30-foot belt conveyor delivered the cold material direct to the bucket elevator, by-passing the dryer.

The asphalt for the hot-mix top was stored in three 8,000-gallon tanks and delivered to the weigh box by a Kinney asphalt pump. The asphalt was a medium-cure extra heavy material cut back with about 11 per cent kerosene. The plant produces 700 tons of hot-mix in 10 hours with a 55-second mix in the pug mill, and produced 1,200 tons of the slurry base in the same length of time. The aggregate and water for the slurry base were weighed in the same manner as the aggregate and asphalt for the top. The batch weights for slurry base were: 2,750 pounds of mixed aggregate with the added water weighing from 20 to 60 pounds so that the water in the final mix was 6 per cent of the total weight. For the top the aggregate was divided into 60 per cent passing a 3-mesh screen and 40 per cent retained on the 3-mesh screen, the maximum size being 1-inch stone. The total weight of the batch was 2,750 pounds with 120 pounds of asphalt.

When the plant was operating on hot-mix the steam from the coal-fired boiler supplying the heating coils of the asphalt tanks was used to operate the pug mill gates, but when the plant was running slurry base, an Ingersoll-Rand compressor supplied air for the operation of the gates. The plant used by Hemstreet & Bell is a Totman portable asphalt plant made by the Standard Steel Works of Los Angeles, Calif. The same cylindrical bucket is used for weighing the water for the base and the asphalt for the top. A total of fourteen motors varying from 100 hp down to 3 hp are used in the operation of the plant.

Placing Base and Top

Each of the 3-inch slurry base courses was placed with the machine described earlier in this article. Each course was rolled at once by a 6-ton Acme roller with a 42-inch roll. The specifications required that the base be damp when rolled, and frequently in the hot dry atmosphere of California the base dries out before the roller can compact it satisfactorily. For wetting the base the contractor had two sprinkling trucks, each with 1,500-gallon elliptical tanks and one equipped with a 3-inch Fairbanks-Morse centrifugal pump mounted

on the White truck chassis to fill the tank. The other White chassis had no pump so a portable 3-inch centrifugal with a Ford engine on skids was used for filling it. The bottom course was rolled damp and the top rolled in a slush or slurry condition, hence the common name "slurry" for this base which is specified as "crusher-run" base. When the top course was dry it was cleaned with a rotary broom and primed with 1/4-gallon per square yard of medium cure 120 to 150-penetration asphalt cut back with about 27 per cent kerosene.


The hot-mix top was placed on the primed base course using the same spreader as for the slurry base. It was placed at a temperature of 225 to 250 degrees Fahrenheit, and rolled with the 6-ton Acme roller. The widened section was then ready for traffic.

Personnel

The contractor for this widening of the old 15-foot concrete pavement on U. S. Route 99E from the Butte County line to 3 miles north of Los Molinos,

Calif., was Hemstreet & Bell of Marysville, Calif., for whom Adam Goetz was Superintendent. J. C. Young was Resi-

dent Engineer for the California Division of Highways, under F. W. Haselwood, District Engineer.



PATENTED
MECHANICAL MIXER TRUCK
WITH COUNTER

OPERATES OFF THE MIXER SHAFT—CAN BE INSTALLED ON ANY ASPHALT PLANT. APPROVED BY STATE HIGHWAY DEPARTMENTS.

HETHERINGTON & BERNIER INC.
INDIANAPOLIS, INDIANA
Builders of Asphalt Paving Machinery

BUILT TO HANDLE TOUGH JOBS AT LOW COST!

THAT'S WHY CONTRACTORS ARE CHANGING TO FORDS

• Here is a truck you can put on the job and be sure it will stay on the job . . . mile after mile, month after month. The 1937 Ford V-8 Truck is built to "take it" . . . to tackle the tough jobs and get them done at a cost that's easy on your pocketbook.

• Here is a truck you can try on the job and find out for yourself how it handles your work, what it costs to operate. There's no cost, no obligation, no "strings" attached to this offer. All you have to do is call your nearest Ford dealer and set a date for an "on-the-job" test with your own loads, under your own operating conditions. We are content to let the truck itself convince you!



Convenient, economical terms through the Authorized Ford Finance Plans of the Universal Credit Company



• The Ford V-8 Hydraulic Dump Truck is available with either direct-lift or arm-lift hoist. Load space is 84 in. long, 66 in. wide, 12 1/2 in. to tops of sides. Capacity is 1 1/2 cubic yards.

FORD V-8 TRUCKS

AND COMMERCIAL CARS



Tractor Front End Attachments

Write for Circular on types, sizes and prices

White Mfg. Co.
ELKHART INDIANA



The New Good Roads Chip Spreader

Mechanical Chip Spreader Of Large Capacity

A hopper-type chip spreader driven by a trailing wheel and which is quickly attached by two steel bracket arms resting on the rear cross member of the truck frame has been announced by the Good Roads Machinery Corp., Kennett Square, Pa. A vertical adjustment of 12 inches in the bracket arms provides for varying heights in truck frames and a hand-operated winch, equipped with a brake and lock, is connected by a steel cable passing through a series of sheave wheels to large hooks which attach to the tailgate, making the attachment of the spreader to trucks of any height a simple process.

The spreader with its load is carried by the truck and works with equal effectiveness with the truck in reverse or moving forward. The trailing wheel operates a spiral agitator within the hopper and hinged doors at the base of the hopper permit spreading at various widths. The doors at the outer end are 6 inches wide and all intermediate doors are 12 inches wide. By opening or closing these doors variable spreading widths are possible, ranging from 6 inches to 9 feet.

Vibrators for High and Low Slump Concrete

Designing its various models of vibrators, the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City, has had particularly in mind the types of concrete for which they are best adapted. Model 315 is designed for concrete above a 3-inch slump, Model 325 for concrete under a 3-inch slump, Model 418 for heavier concrete and Model 518 for heavy mass concrete.

The Model 518 delivers 7,000 vibrations per minute, requiring 35 to 40 cubic yards of air per hour. It weighs 65 pounds and has an overall length of 4 feet with a diameter of 5½ inches. It is specially designed for vibrating heavy concrete in dams, large bridge piers,

abutments, footings, and other structures where large volumes of concrete are required.

The Shimmy Spade is built in three sizes, Models 315, 325, and 418, and is operated by a Power Vane rotary air motor with air consumption varying from 35 to 65 cubic feet per minute, according to the model. The motor is flexibly supported and encased in the vibrator tube, making the unit compact and easier to handle. No flexible shaft for power transmission is required as a positive-acting floating coupling relieves the strain from the motor and eliminates shaft maintenance and replacement. These vibrators are watertight in construction and the flexible metal inner air hose will not disintegrate or swell. The Shimmy Spade operates at 8,000 vibrations per minute and weighs 30 to 45 pounds, according to the model. The vibrating tube is 3 or 4¼ inches in diameter and 17 to 25 inches in length. Standard equipment consists of a 5-foot exhaust hose, 15 feet of auxiliary hose

for operating in deep forms, a line oiler and a twist throttle which can be located at the end of the 5-foot exhaust hose or at the end of the 15-foot auxiliary hose to suit concrete paving conditions.

Need for Quick, Accurate Visibility on Roads at Night

"The abnormal hazard on streets and highways at night is attributable in part to fatigue, carelessness, and drinking, but the greatest single cause is inability to see quickly and accurately," said Dr. Matthew Luckiesh, Director of General Electric's lighting research laboratory at Cleveland, in a recent talk to California highway, automotive and safety officials.

On a vast majority of rural highway mileage, it is perfectly possible to obtain adequate visibility for safety with modern automobile headlights if they are well-maintained and properly used, Dr. Luckiesh said. "On the most

heavily traveled highways, however, where the motorist faces a succession of on-coming headlights, good overhead lighting must be relied upon to solve the problem of the appalling and sharply rising night-accident toll. There is no excuse for postponing the installation of such lighting on those portions of the main highways where there is a high concentration of night accidents."

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A new note in crawler crane design has been sounded by LIMA. It is now possible to have a machine with which all major operations can be accomplished simultaneously. Hoist, swing, travel and boom up or down at the same time, is a feature of great importance to contractors who handle a wide variety of work. If your job is confined to space limitations it is certain that it can be handled quicker and better with a LIMA. LIMA independent clutch control plus scores of other exclusive features are your assurance of more profitable and efficient crane operation.

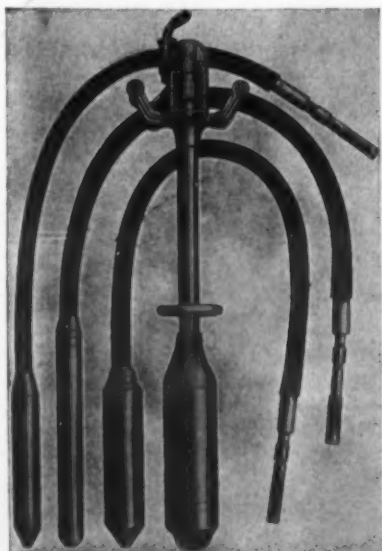
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SHOVEL and CRANE DIVISION LIMA, OHIO, U. S. A.

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LIMA



Four Models of the New C-P Concrete Vibrators

City Water Saves Job In Hot Iowa Summer

**Koss Construction Co.
Found No Water on Job;
Hard Clay Grade Very
Difficult to Work**

WHEN water disappeared from the creeks along its 11-mile paving contract on U. S. 63 north of Montezuma, Iowa, the Koss Construction Co. had to resort to using city water. The water was taken from a city hydrant and run into a large storage tank from which the contractor's C. H. & E. triplex pump delivered it to the 2½-inch pipe line which ran the entire length of the job. On this FAP 174-A, C & D, the contractor set up his batching plant close to the middle of the work and paved from the north end toward the plant and then started from Montezuma and paved back to the batching plant.

Lack of water was not the only real trouble that faced the crews working on this job. The fills had been laid up with a clay that when baked in the tropic sun of last summer became tough as indurated rubber and about as amenable to the action of a grader, fine grader or tail-grader. Hand-wielded mattocks were about the only effective means of reducing the tough subgrade to proper contour. This was particularly evident when the Surgrader was taken ahead over a super-elevated section and the cutting of the grade left entirely to the tail-grader pulled by the paver. Repeated trips over the grade with the tail-grader loaded to the limit with, not man-hours this time, but man-weight to force the blade into the tough clay slowly wore it down. Wetting with the sprinkler hose softened the material slightly but the good old hand mattock cut the greater part of the material out.

The rough grade was handled on the level tangents by a heavy grader followed by a Ted Carr Formgrader for the form trenches and then a 5-foot rotary scraper pulled by the Caterpillar Thirty that did all the odd jobs up front. Immediately behind the rough grading came the form setters, a foreman and twelve men doing all the hand-trimming, tamping and realigning of the forms. The tough cutting of the grade on the tangents was done with a Flynn Surgrader, a power-operated machine which cut the grade to within ¼-inch of final grade and delivered the excess material beyond the forms. In order that this machine might work uninterruptedly and still permit the batch trucks to run down the grade, which was the only place they could in some of the tight places in towns, a heavy ramp of steel plates was built over the top of the Surgrader. Heavy springs attached to the machine and to the ramps prevented too great a shock when the trucks went on or off the ramps.

The grade crew behind the machine consisted of a foreman and six laborers who checked the grade with a scratch template and hand-tamped all low places that had to be filled behind the Huber 7-ton roller on the grade. The grade crew was aided by a Caterpillar power patrol grader working between the forms.

Batching Preparatory to Pouring

Aggregates for the concrete were delivered to the batching plant site in gondola cars by the Standard Investment Co. from Muscatine, Iowa. The cement came in box cars from the Hawkeye Portland Cement Co., at Des Moines, Iowa. The aggregates were unloaded by an American Hoist & Derrick Co. crane with a 42-foot boom and a 1-yard Blaw-Knox clamshell. There were two

men cleaning up in the cars, the crane man, and the batcherman on the Johnson batching plant.

On the bulk cement there were two cars opened at the same time and three men worked from each car with two Johnson Kone Karts per car, the extra man aiding in shoveling to the carts. The bulk cement platform was wide enough for two carts to pass on the way to the Fairbanks scales where each load was weighed accurately. The contractor ran 22 single batch trucks on a haul of a little more than 2 miles. The trucks were backed under the batching plant and received their load of aggregate and drove forward close to the cement dock where the drivers shoveled the sand forward to leave a hole for the cement.



C. & E. M. Photo

Business as Usual on the Subgrade Without a Minute's Delay for Batch Trucks

Then they drove beyond the cement trap and backed under it to receive the load of bulk cement. This was done because the counter-balanced dumping trap did not lift high enough for the canvas chute to miss the cab and the drivers preferred to back in and save the shower of dust each time. They drove away from the cement dock to a platform where a laborer stepped onto the load

and shoveled the sand back over the cement to prevent its being blown off in the run to the paver. The tail-gate of each of the trucks was plugged with burlap to prevent loss of the cement through the ends.

The weights of the aggregates and cement per dry batch were: 1,619 pounds of sand; 1,957 pounds of gravel;

(Continued on page 46)

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In CACTUS LAND

The Bucyrus-Monighan Walker is as much at home negotiating the desert's soft yielding sand, as it is in marsh lands, mudflats and on irregular bumpy terrain. The Walker is a native no matter where its owner takes it.



A Walker at work on the Gila Federal Reclamation project, Arizona.

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SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Georgia Motorists Pay \$1 For 12½ Cents of Roads

Additional reasons for the withdrawal of Federal-Aid road grants from states which spend motor tax revenues for purposes other than highway financing have developed in Georgia, where final state reports for 1935 indicate that less than 12½ cents of every dollar Georgia motorists paid for roads actually was spent for roads.

Information reaching the American

Petroleum Industries Committee reveals that Georgia's road fund diversions reached a new high peak not only in proportion to revenue collected, but also as to variety of purposes for which money was diverted from roads.

The reports indicate that the Georgia general funds received \$1,539,150, while the military department, the chief executive, the prison commission, the public service commission, the revenue commission, the comptroller general, and the department of education all received substantial amounts from the money col-

lected from motorists. The highway department had on hand \$6,361,132 at the end of the year, increasing the amount diverted or not used in 1935 to a total of \$15,676,623, and leaving only \$1,781,630 of the \$17,458,254 paid in special motor vehicle taxes actually spent for roads.

The Georgia Highway Department is reported to have received \$5,343,711 in Federal-Aid funds during 1935 and enough from taxes and other sources to make the total available for roads \$29,225,333.

International Harvester Has New N. Y. Service Station

A new and up-to-date branch service station, offering 24-hour service seven days a week, was recently opened at 42nd Street and 11th Avenue, New York City, by the International Harvester Co. of Chicago. This is the eighth branch in the metropolitan area and the two hundred and thirty-seventh company-owned branch and service station in the United States and Canada.



THE "Tractionized" surface of a Tarvia road provides lastingly safe traction for high-powered, high-speed automobiles.

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Detroit Philadelphia Buffalo Lebanon Rochester Baltimore Minneapolis
Cleveland Columbus Providence Toledo Youngstown Syracuse Hartford
Boston Milwaukee Cincinnati Bethlehem Portland, Me. Norwood, N. Y.
In Canada: THE BARRETT COMPANY, Ltd. Montreal Toronto Winnipeg Vancouver

Highway Slab Gaps Closed By Hooks

The difficulties encountered with concrete road slabs side-slipping on unstable foundations is well known to highway departments. An interesting and inexpensive manner of realigning these concrete slabs has been used in Connecticut and has recently been described by A. R. Collier, Superintendent of Bridges, in *Concrete Highways*. Mr. Collier points out that invariably where there are side slips there is also some settlement and Connecticut has taken advantage of this in the method devised for drawing the slabs together.

The slab is prepared for leveling and then Mud-Jacked to within 1 inch of grade. The transverse joints are then freed, if necessary, by a series of holes and a pavement breaker. The longitudinal joint is cleaned out. This is done with a pick plow attached to a single line, drawn by a truck. By changing points, joints with an opening as small as 1/2-inch can be easily cleared. This having been completed, the slab is free on all sides.

Large hooks are then set along the edge of the slab, one pair at the center and one pair at each end. Each set of hooks is then connected with a 3 and 2-pulley block and falls, threaded with a 5/8-inch cable. Where both sides of a pavement have side-slipped, the pulling-end hooks must be placed in different positions. In such cases the pulling-end hook is placed on the slab to be shifted while an anchor hook is placed on the solid edge just over the freed transverse joint. After the first slab is in position, the hooks are shifted to the opposite corners to pull the second slab into place.

Trucks are used for the actual moving operation. The cable from each block and falls is attached to a truck. Two of the trucks are stationed at opposite ends of the slab about 100 feet from the ends. A third truck is located a little distance ahead of one of these, with its cable running under the truck which is attached to the center hooks. Each truck takes up the slack in its cable until an equal strain is approximated. On signal, all three trucks pull together and the slab is easily moved laterally to the desired position.

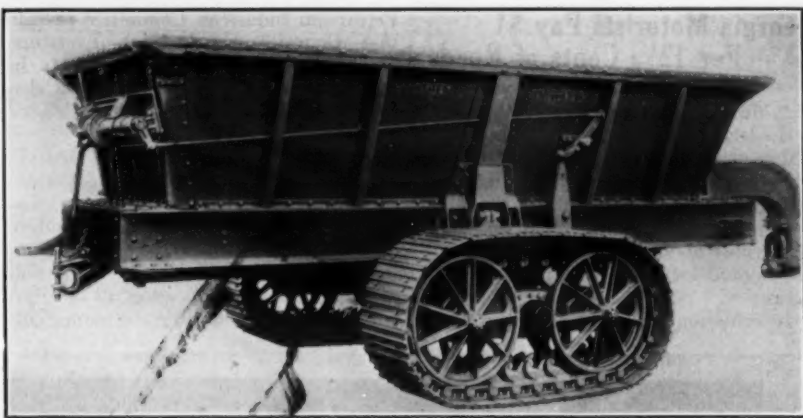
With this operation it is unnecessary to detour traffic. The longest delay that this work has caused to traffic is 7 minutes for a 60-foot slab. When filling transverse joints and cleaning the longitudinal joint, one-way traffic is maintained.

This work of raising and realigning

pavement in Connecticut was started in November, 1931, and, with the exception of periods of extreme cold weather, has been practically continuous. During this time approximately 112,365 square yards of concrete pavement has been brought back into alignment. The maximum opening corrected has been 14 inches.

New 18-Yard Bottom-Dump Trailer for Dirt Moving

A new 18-yard bottom-dump trailer, mounted on 30-ton wheels, has been announced by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill. Embodying all of the tested features of previous Athey Forged-Trak bottom-dump trailers, this new unit is built to carry capacity loads where track-type tractors can operate. It is designed to take advantage of the greater tractive power now available by offering larger



The New Athey Bottom-Dump Trailer

capacity dirt-moving units.

The axle and drawbar are spring-mounted to absorb loading shocks as well as those of hard going. There is a simple, positive, mechanical wind-up.

The construction of the entire unit is rigid to carry heavier loads.

Complete information on these new bottom-dump trailers may be secured direct from the manufacturer.

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from coast to coast spreading good news like this, no wonder new thousands are switching to Dodge trucks. So, do this before you buy any truck: Check up on the combination of quality features you get in the low-priced Dodge—you'll find it's a combination of money-saving advantages not offered anywhere else. Get a show-down. Compare...see how far ahead Dodge is! See your Dodge dealer today.

DODGE—Division of Chrysler Corporation



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SIX GREAT ENGINE ADVANCEMENTS—Dodge gives you a six-cylinder "L" Head engine with 6 special gas and oil saving features.



NEW 1937 DODGE 1/2-TON EXPRESS—6-CYL.—Offered on 120" chassis with 84" body and 136" chassis with 108" body. Has all the gas, oil and tire saving features and long-life construction that make Dodge world-famous.

NEW 1937 DODGE 1 1/2-TON DUMP—6-CYL.—126 1/2" W. B.—Priced with the lowest...and what a value! Built to stand up under months and years of hard service. Will haul maximum loads at lowest cost per mile for gas, oil, tires, upkeep.

MORE HIGH-QUALITY FEATURES



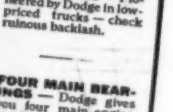
FULL-FLOATING REAR AXLE—Pioneered by Dodge in low-priced 1/2-ton trucks.



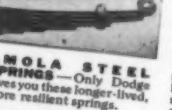
ROLLER-BEARING UNIVERSALS—Pioneered by Dodge in low-priced trucks—check ruthless backlash.



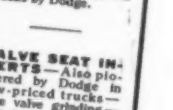
ONE-PIECE REAR AXLE HOUSING—Another feature pioneered by Dodge.



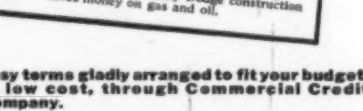
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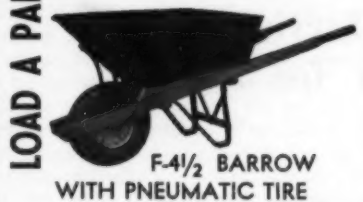


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Surface Scaling Of Concrete Roads

Causes and Measures Which Have Proved Effective in Checking Surface Deterioration

DURING the winter and spring the attention of highway engineers is forcibly directed to the scaling of concrete road surfaces. This trouble seems to be occurring and reoccurring more frequently each year and is one of the most serious problems confronting concrete highway designers and maintenance engineers.

Importance of Curing

The causes of scaling are not easy to determine. Therefore, the explanations that are offered are many and varied. Most engineers seem to agree, however, that a large part of the trouble may be prevented by employing more effective curing methods. The designer always specifies an exact water-cement ratio, but the value of this ratio is lost if the water is allowed to evaporate before performing its function. Concrete "sets" because of chemical reactions between the cement and water. This hardening process continues indefinitely, providing that there is sufficient moisture retained. The greatest evaporation loss occurs during the first few hours. Therefore, the type of curing during that period has a decided effect on the potential strength, density and durability of the concrete.

Rapid evaporation not only produces a surface layer which is low in strength and highly permeable to water, but also results in the formation of a multiplicity of minute hair cracks. When concrete dries too rapidly, it is probable that some unhydrated cement particles remain embedded in the solidified mass. Eventually moisture penetrates the slab through the slowly widening and deepening hair cracks, and retarded hydration takes place, causing what is generally termed "scaling".

It is a generally accepted fact that proper curing increases the compressive strength of concrete, but its effect on other properties is of even greater importance. Building up the internal

structure, by giving an opportunity for complete hydration, brings out all the inherent qualities of a concrete mass.

Application of an impervious film to the surface of the uncured slab, immediately after finishing, not only insures complete hydration throughout the full depth and an increase in density and wearability of the surface layer, but also substantially prevents the formation of evaporation cracks. Gloster P. Hevenor, Chief Engineer, The Johnson-March Corp., pointed out when interviewed recently.

The work of Professor William J. Krefeld, of Columbia University, shows conclusively that the compressive strength of the top inch of a poorly cured slab may be as much as 50 per cent below that of a film-cured slab which, due to the impervious surface protection, is not subject to the same surface evaporation as insufficiently protected concrete.

Improper Finishing

The skin strength developed by properly cured concrete is a distinct aid to the wearing qualities of the slab. Too much finishing, when a surplus of fines are brought to the surface, or retarded finishing, when the finishing is delayed almost up to the time of initial set, will undoubtedly cause a mechanical break in the surface bond which will probably result in spalling, hair checking or scaling.

Shrinkage

It is a well-known fact that a concrete mass changes volume during the early stages. The fundamental cause of shrinkage is the loss of water by evaporation from the surface. Shrinkage really takes place in two stages: first, while the concrete is a plastic mass; and second, after the initial set and during the period of hardening. Shrinkage during the first period is rapid, the rate depending on the amount of evaporation. In thin concrete, such as a highway slab, an abnormal amount of shrinkage in the early stages will inevitably result in hair checking and later surface scaling.

(Continued on page 49)

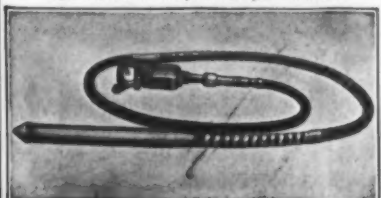
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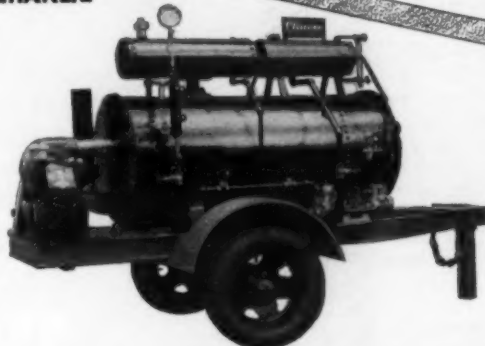


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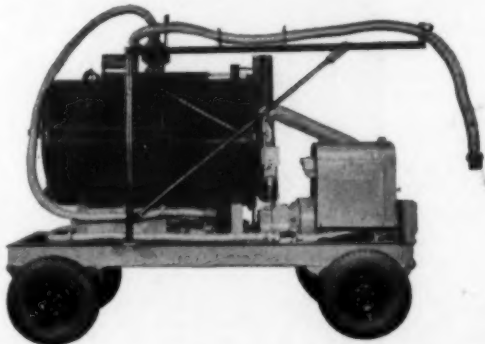
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Maintenance Costs For Wyoming Roads

Improvement in Type of Surface, Study of Failures and Control of Organization Have Decreased Costs

By JAMES B. TRUE

Superintendent-Engineer, Wyoming State Highway Department

THE State of Wyoming has a transportation system to maintain consisting of 2,646 miles of various types of oiled surfacing; 34 miles of concrete and other more permanent pavement and 888 miles of earth and gravel surfaced roads; making a total of 3,568 miles.

On January 1, 1931 there were 351 miles of oiled or higher type roads, the remainder of the system being either of an earth surface or gravel surface. In six years, this mileage has grown to 2,646 miles. This rapid growth, which has been fairly uniform each year, has required during the six-year period a complete change in maintenance operations. With the exception of the necessary maintenance on the gravel and earth surfaced roads, the patrol system has been abandoned.

Changing from a gravel system to an oiled surface in such a short length of time has taxed the abilities of the engineers and maintenance men of the department. That their efforts and studies have not been in vain is demonstrated by the fact that in 1932 the surface maintenance cost of the oiled roads was \$140 per mile; in 1933, \$123 per mile; 1934, \$113 per mile and 1935, \$94 per mile, which is a reduction of 33 per cent. This reduction has been made possible by changing maintenance methods and equipment from the predominantly gravel maintenance to the predominantly oil maintenance. It is also due to the fact that experience has shown what portion of the surface requires the most maintenance and the causes of such failures. As a result, changes in design and construction have been made to eliminate faulty conditions. Another reason is that the experience gained has resulted in a type of surface more nearly approaching a permanent type of pavement, rather than the more or less temporary oiled surface constructed at the beginning of the period, and lastly the strict budgeting of funds for maintenance and a control of the size of the maintenance organization has been practiced.

Maintaining Oiled Roads

Maintenance operations on oiled roads differ very little in general from those used in other states. Patching with stone chips with RC cut-back asphalt is used as long as this method is economical and is also used on some of the more heavily-traveled highways where tearing up of the surface would cause too much inconvenience to traffic. However, in general, tearing up and relaying by means of scarifiers and auto patrols is practiced when patching operations become too costly or when the road begins to lose shape. This tearing up and remixing is largely confined to the surfaces which were constructed early in the period when the construction refinements now being used were not practiced. Probably 60 or 70 miles out of the 2,646 has to be torn up each year.

It is a policy to keep the surface sealed, from one to two-tenths of a gallon per square yard of RC-2 cut-back being used. This seal is charged to surface maintenance and included in the figures given above, as well as the patching and remixing and on some of the more recently constructed roads all of the surface maintenance there is consists of this

seal work. When stone chips or armor coat is applied at the same time as the sealing, this work is considered as bringing the surface to a higher type and is not charged to maintenance. Some 143 miles of the state highway system have been treated in this manner.

Snow Removal and Other Costs

As far as surface maintenance costs are concerned, Wyoming's roads might be roughly divided into two classes. First, the surfaces constructed early in the six-year period at a low cost, more or less as an experiment, to get the traffic through, some of which surfaces now are being forced to carry heavier traffic than was anticipated when they were constructed, and the surface maintenance cost is considerable more than the \$94

per mile average given above; probably averaging around \$150 per mile. On the other hand, the surfaces built within the last two or three years, no matter what the traffic, and some of the older surfaces which do not carry such heavy traffic show surface maintenance costs running about one-half of the average of \$94 given above. In fact, one county in the state, in which all of the state highways have an oiled surface, shows a surface maintenance cost for the 122 miles in the county of \$55 per mile of highway.

Of course, to this figure of \$94 per mile for surface maintenance costs must be added a cost of \$40 per mile snow removal in 1935 and \$61 for miscellaneous items, such as weed cutting, bridge painting, cleaning ditches and other

necessary items, giving the total average maintenance cost during 1935 of \$195 per mile. Snow removal costs during the period under consideration varied from 7 per cent of the total to 17 per cent of the total, the latter figure being that of 1935.

New Dealer for Lima Shovels

Lima Locomotive Works, Inc., Shovel & Crane Division, Lima, Ohio, has announced the appointment of the Boehck Equipment Co., 2404 W. Clybourn St., Milwaukee, Wis., as distributor of Lima excavators in Wisconsin. This company has had many years' experience in supplying construction equipment to the industry.

On the
WORLD'S LARGEST
EARTHFILL DAM..
ALLIS-CHALMERS OWNERS

WEST SLOPE CONSTRUCTION CO. "REPEATS"

In February, 1933, West Slope Construction Co. ordered their first model "L" Tractor. Since then, they have purchased 13 Model "L's," 7 Model "L-O" Oil Tractors, a Model "K" and 4 Speed Patrols—a tribute to the satisfactory performance of Allis-Chalmers equipment on San Gabriel Dam No. 1.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

Pulling Wood Piles By a New Method

From oil field practice comes something new for the construction field. The usual method of pulling wood piles is to throw a chain around the pile and start pulling. If the wood is at all decayed the chain will cut the pile in two.

Kellems Products, Inc., 1911 Park Ave., New York City, has proved the value of adapting its expansible and contractible cable grips to this problem. These grips have been used for over 30 years for pulling electric cables through underground conduits; in small sizes, for securing traction on broken bones in fingers and toes and in large sizes for changing steel ropes on rotary

drilling rigs in the oil fields.

The grip, with a tensile strength of over 200,000 pounds, is made of $\frac{3}{8}$ -inch improved plow steel rope and will pull pilings from 14 to 18 inches in diameter. It consists of a circular cable mesh, with metal fingers at the lower edge and two loops at the top. This mesh is so constructed that when placed over a pile the metal fingers grip the pile, and the greater the pull, the tighter the grip of the cable mesh on the pile. Because of its flexibility it will conform to the uneven surfaces of the piling and it secures traction on a minimum of 4 feet of the pile, reducing the possibility of breakage to a minimum. These grips are available in two sizes, small for 10 to 14-diameters, and large for 16 to 18-inch diameters.

Morrissey Becomes Head Of P & H Weld Rod Sales

The appointment of J. P. Morrissey as head of the Weld Rod Sales Division has been announced by the Harnischfeger Corp., Milwaukee, Wis. Mr. Morrissey has had years of practical experience both in the United States and abroad.

One of his most interesting experiences was that as Technical Welding Adviser for the Russian government in 1930, described in an interesting article in the *Saturday Evening Post*. Mr. Morrissey was also special representative on weld rods with the Crucible Steel Co. of America for six years, and was associated with the Fusion Welding Corp. as Philadelphia District Manager.

Pouring Culvert On Steep Slope

E. O. Jackson, Elizabethtown, Ind., Pours Box Culverts In Novel Way on Indiana Job

WHEN a Model A Ford hauls materials it is not news, but when it plays elevator and hoist for concrete buggies, that is news. E. O. Jackson of Elizabethtown, Ind., a subcontractor for the culverts and drainage structures on a grading, drainage and retreat contract awarded to Ralph Rogers Co. of Bloomington, Ind., makes the news in this case.

The longest and steepest culvert in the contract was a 3 x 2-foot box 268 feet long with a drop of 90 feet. The next, which we shall describe here, was the same size but only 174 feet long and with a drop of 40 feet. Handling aggregates, mixer, water and finally the concrete on slopes like that provides something to think about. Jackson overcame each problem quite readily.

On most of the culverts on this work, the water was right at hand and all that was necessary was to set up the Barnes pump powered with a Johnson motor in the creek and pump to a small tank above the mixer. On the larger of the culverts, however, there was no water and the slopes made handling it difficult. A tank wagon consisting of a 400-gallon tank lashed on a flat bed truck was used to transport the water to the site after it had been filled by the pump. The water was siphoned out by a hose from the tank wagon to the mixer tank as needed.

All aggregates used for concrete on Indiana road work must be stockpiled on heavy wood planking laid on the ground and with suitable barricades between the different sizes. Jackson provided such storage near the top of the 174-foot culvert and set up the Jaeger 2-bag mixer close by so that the aggregates, after weighing in the wheelbarrows on a Winalow wheelbarrow scale, could be pushed up a short ramp to the mixer skip. After mixing one minute with the proper amount of water, the concrete was delivered to one of the two concrete buggies which ran on a runway constructed on top of the culvert forms. A full buggy of concrete on a slope of 40 in 174 feet or 90 in 268 feet will travel rapidly downhill even when restrained by two husky men. To prevent the chance that the buggy might get out of control and be precipitated over the lower end of the culvert forms, the contractor attached a long rope to the buggy handle, and snubbed it about a stump. A man was detailed to let the buggy down slowly but it went down by fits and starts, wasting concrete, and it was rather rough on the man's hands. The contractor then ran the rope through a sheave at the upper end and attached it to the front of the Model A Ford. The Ford towed the loose rope up and acted as a brake on the speed of the buggy when it was filled and started downhill. The Ford did not fail.

The concrete was poured into the forms through a tremie with one man on top and five men puddling in the forms. There were two men on each buggy to guide it down and pull it up. Five men handled the shoveling and wheeling of the aggregates, one man weighed the wheelbarrows and the mixer man attended to the cement for each batch.

The floor of the culvert was poured first complete from the lower end up and allowed to set for several days and then the barrel of the culvert was poured complete.

One of the most spectacular efforts of man to control the destructive forces of nature is San Gabriel Dam No. 1, near Los Angeles. This mammoth structure necessitates the blasting, quarrying, removing and placing of 10,809,000 cu. yds. of rock and earthfill . . . will tower 375 ft. above bedrock, with a crest length of 1,540 ft., and a base width of 1,950 ft. Scheduled for completion in June, 1938, it will be the largest, highest dam of its type in the world.

Working against time and the elements, with reliable performance of equipment and big output absolutely essential . . . West Slope Construction Co. selected a fleet of Allis-Chalmers Tractors and Speed Patrols. Photo No. 1 shows a general view of the fill, with a Model "LO" Oil Tractor and sheep's foot roller in the foreground. In No. 2 and No. 3, other "LO's" are shown bulldozing material down the west slope of the canyon for loading by shovel into trucks. No. 4 shows an A-C Speed Patrol grading and leveling the fill where trucks have been dumped.

On jobs large and small, Allis-Chalmers Tractors not only make more trips per hour but give the kind of dependable performance that leads to "CHEAPER PER YARD" dirt moving. That is why Allis-Chalmers owners "repeat".

Controlled Ignition OIL TRACTORS

Quarrying Rock For Wash. Jetty

(Continued from page 9)

floor is about that distance from the top of the cliff, the quarry being in the form of a terrace cut out of the perpendicular wall of the cliff. The objection to the well-drill holes, however, was that the rock did not come out well, and was badly shattered. Humps were also left on the quarry floor which called for secondary drilling and blasting and which produced nothing but waste rock.

But during these experiments, the floor of the quarry was at least well started, the same 55-B shovel doing all the work of rock removal, laying railroad tracks, etc. With a good face exposed, the next step was to try coyote holes. These were driven at intervals along the face to a distance of 30 feet, drifting each side at right angles in a "T".

Coyote Holes Win Out

Everyone knows that a coyote hole is a sure method of getting down rock. It did not fail here. The holes and drifts were drilled with the same S-49 Jackhammers, with wet head attachments, the explosive used in driving holes and drifts being 60 per cent du Pont gelatin dynamite exploded with cap and fuse. After driving, the drifts were loaded with du Pont black blasting powder in 25-pound bags and ignited with a primer consisting of about a dozen sticks of 40 per cent gelatin. The rock came down all right, but the nigger in the woodpile lay in the fact that the 30-foot bite of rock, suitably sized for jetty work, lay piled up in front of the one working face of the quarry, none too wide at best. Until this was loaded on the cars and cleared away, it was not possible to start a new line of coyote holes. When the face was reached so this could be done, the shovel would then have to wait until the tunneling and drifting for the next round had been completed.

Tunnel Speeds Quarrying

As a result of this condition, a new plan of operation is now being followed, which, if not the first time it has been used, is at least rare. The quarry is being extended longitudinally along the face of the cliff toward a right angle bend of the river, though many thousands of tons of rock intervene. A main tunnel was driven straight through this mass, on a level with the quarry floor, coming out on the far side of the bend. This tunnel, originally 480 feet in length, has a cross-section 7 feet wide by 9 feet high. At intervals of 30 feet along the tunnel, 3 x 4-foot cross drifts are driven, 100 feet long on each side of the tunnel and constituting the full width of the face.

Here is the advantage of this plan. With the tunnel open at the far end, the



Typical "A" Rock, Weighing from 25 to 30 Tons Each, Ready for the Journey From Quarry to Jetty

drifting work can be done independently of the operations at the face. The drillers come in at the other end of the tunnel. So do the water, air and ventilation lines, the first two being carried up over the hill. As a matter of fact, the drifting for the entire mass

is being done far in advance of the shovels working at the face.

As the end face advances and more and more good jetty rock is exposed on the side of the quarry, coyote holes can be used there to advantage as they can be driven at various points, the rock

brought down and other holes driven elsewhere without waiting for the shovels to clear the rock away. It is at the restricted but all important end face which is extending the quarry that the advantage of driving the tunnel is evident.

After one section of the main end face of the quarry has been shot down from one of the tunnel drifts, the quarry end of the tunnel is covered with rock. As the jetty rock of the various sizes is removed and loaded on the cars, there is some small stuff remaining, together with some overburden which has come down with the rock. While the shovels are clearing this up, the tunnel opening is again exposed and the explosives for the next drift may be carried in from the quarry end of the tunnel. No time is lost in this way. By the time the shovels have completed the clean-up, the next shot is ready to go.

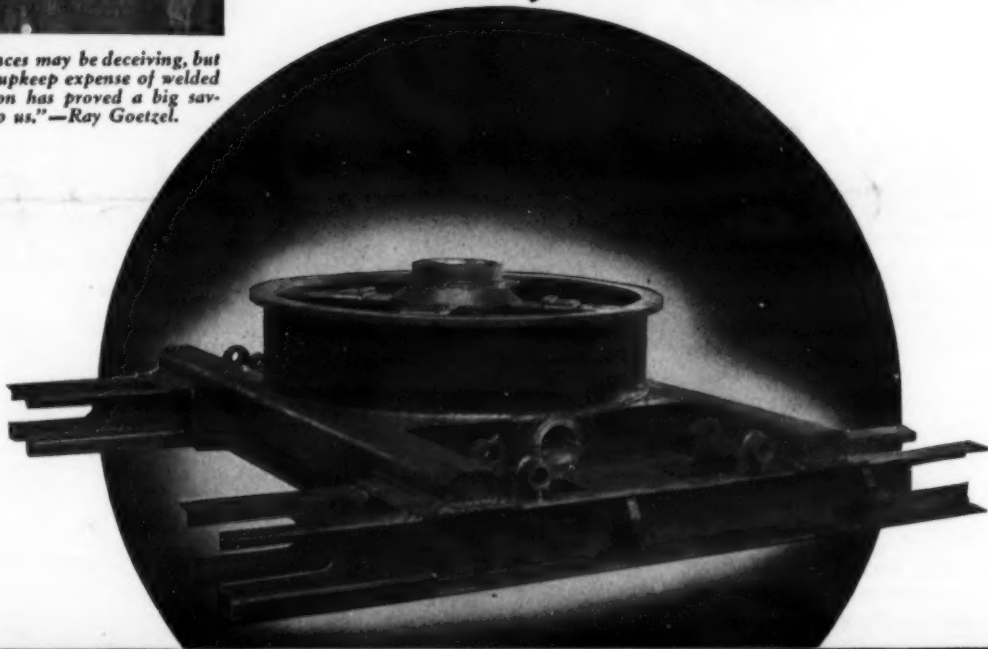
In driving the drifts from the main tunnel, they are directed slightly downward, so as to get the explosive below

(Continued on page 50)



"Appearances may be deceiving, but the lower upkeep expense of welded construction has proved a big saving to us."—Ray Goetzel.

Why this
WELDED CARBODY
is far better



P.H. Pacemakers-FASTER ON THE JOB

● No bolts — no rivets to work loose or shear. Electric welding of new high tensile steels makes it far lighter — yet actually stronger. The P&H carbody and crawler frames are welded into one rigid unit to insure perfect alignment of driving machinery . . . to save repair bills. This advanced construction, now being adopted by others, was introduced by the Harnischfeger Corporation.

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Air operated vibrators for all classes of concrete construction including bridge deck slabs, dams and locks.

Portable Vibrating Screed Boards for highway pavements.

Special steam operated vibrators for placing hot asphalt mixtures.

Write for circulars and engineering data

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KNEE-DEEP IN GUMBO

..... BUT THERE'S NO GRIT IN THE BEARINGS

THANKS TO *Alemite Controlled Lubrication*



***Alemite Fittings Seal Bearings
Against Everything But
Lubricant From An Alemite Gun!***

Such going as this is routine stuff for Austin-Western road machinery! You can see the heavy mud piled up axle-high—but you could examine all the surfaces of *all bearings* on this grader without finding a trace of grit.

That's because there's no way for mud to get into the bearings. The only openings are the lubrication points—and every lubrication point *is closed with an Alemite Fitting*, sealed against

everything but lubricant from an Alemite Gun. And when the Alemite Gun forces lubricant to every part of the bearing surface, even the former lubricant is flushed out.

See how easily every bearing on this machine is lubricated—the step-by-step operation is shown in the small photographs. No fuss—no bother—no time wasted. One "shot" from the powerful Alemite Gun *flushes out* all worn grease and coats all bearing surfaces with fresh, clean lubricant—ready for the toughest road job!

More than 95% of all modern construction machinery is now *factory-equipped* for Alemite

Controlled Lubrication! To get best results with these machines, insist on genuine Alemite Lubricants—specially prepared to make them do better work, over a longer period of service, with lower maintenance cost. Alemite Pressure Guns are built to deliver lubricants under high pressure, in measured quantity, under all working conditions. Send for our new FREE manual, "Alemite Controlled Lubrication," and learn what a tremendous *saving* this modern method offers you!

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WORLD'S LARGEST MANUFACTURERS OF
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Enjoy Horace Heidt and his Alemite Brigadiers every Monday evening, over Columbia Coast-to-Coast Network. See local papers for time of broadcast.

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Please send my FREE Copy of your new manual, "Alemite Controlled Lubrication."

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Fool-Proof Roads Must Be Fool-Free

Reporting on the 22nd national convention of the American Association of State Highway Officials, held toward the close of 1936 in California, W. F. Rosenwald, Chairman of the Committee on Traffic Control and Safety and Maintenance Engineer of the Minnesota State Highway Department said: "Traffic control devices, safety engineering, better road design, and all of the other mechanical and engineering accomplishments have contributed much toward making the highways safe. But, even with continued improvement in this field, no feat of highway construction or traffic control can make any road safe so long as a dangerous driver is permitted to careen down that road in an automobile."

Not reasonable speed, but speed in improper places and under improper conditions are responsible for accidents, the convention concluded. From now on the greatest saving in life and limb can be accomplished by: first, education of all drivers of motor vehicles, and second, elimination of habitually reckless, incompetent, or dangerous drivers from the highways through extension of the work of highway patrols and tightening of driver's license requirements.

There are now 26,000,000 motor vehicles in the United States with 44,000,000 drivers. In 1936 there were 827,000 accidents in which 37,000 persons lost their lives. This, Mr. Rosenwald points out, emphasizes the vital importance of widespread public attention to the safety problem, and those phases of its solution that cannot be reached by all the skill of the best engineers.

Fuel Injection Pump For Diesel Engines

A new high-speed solid-injection fuel pump for diesel engines, made at present for 1, 2 and 6-cylinder units, has just been announced by the Timken Roller Bearing Co., Canton, Ohio. There are two sizes of these multiple-unit integral-camshaft pumps, one using a 4-9 mm range of plunger sizes and the other, a 5-11 mm range.

These pumps are of the cam-operated helical plunger type, the metering being adjusted at the factory and sealed. At the lowest position of the plunger, the cylinder receives a charge of oil from the feed line, which is kept filled by a special feed pump connected to the fuel tank. Delivery of the fuel to the engine starts as soon as the piston covers the inlet port and ends when the upper helical edge of the annular groove in the piston opens the overflow or by-pass port on the opposite side of the pump cylinder wall, releasing the pressure to the discharge line. The effective delivery stroke of the piston may be regulated by turning the piston in its cylinder or barrel to vary the point of the delivery stroke in which the overflow port is uncovered.

One of the features of these pumps is that they are driven by constant velocity cams, thus maintaining the delivery of the fuel to the combustion chamber of the engine at a speed adapted to the rate of combustion. The pistons can be adjusted to vary the amount of fuel delivered by a simple, positive method.

For convenience in installation, these Timken pumps are all made to fit standard bases and all connecting parts conform to standard dimensions. The Type A or small size pump, using a 4-9 mm range of plungers, is adapted for use on diesel engines up to approximately 150 hp and operates at speeds up to approximately 4,000 rpm. The B size, using a 5-11 mm range of plungers, is ordinarily used on engines from 110 to 250 hp, operating at speeds up to ap-

proximately 3,000 rpm. These pumps have been tested for a full year in the field on commercially-operated diesel trucks, buses and tractors and have showed both efficiency and stamina to stand up under adverse operating conditions.

New Crusher Bulletin

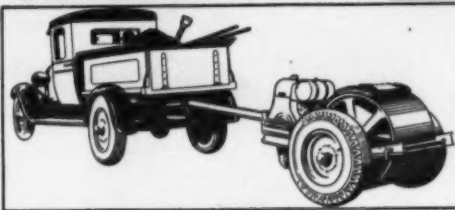
A new bulletin on Telsmith Gyra-sphere crushers has recently been published by the Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis. This 16-page booklet describes the sev-

enteen features of these crushers, contains illustrations and detailed specifications, and shows typical installations.

Copies of this Bulletin No. 263-D may be secured gratis by interested contractors and engineers by writing direct to the Smith Engineering Works.

FOR SPEED
and ECONOMY

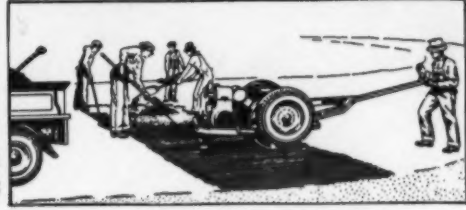
A MOTORIZED WHEELED ROLLER



To and from the Job
a High-Speed Trailer

MODEL 135
COMPRESSION 135 LBS. PER
INCH OF CONTACT

The most economical
and efficient Roller
for all types of patch
work and miscellaneous
small jobs



On the Job
a Self Propelled Roller

Write for DETAILS!

The WHEELED ROLLER Corp. ★ SAN ANTONIO, TEXAS

Investigate—know the Fine Performance

of BLAW-KNOX

Gas-Electric

ROAD
FINISHERS



For Concrete and
Bituminous Paving

★ The use of the Blaw-Knox Gas-Electric Road Finisher by road building contractors throughout the country is definite proof of the practical efficiency demonstrated by the Blaw-Knox gas-electric principle.

Some of the advantages of the Blaw-Knox Gas-Electric Road Finisher are:

- | | |
|--|--|
| Rapid and easy adjustment of width. | Faster; greater flexibility of speeds. |
| More positive and smoother power and traction. | Removable flanges on traction wheels, for quick wheel changes. |
| Greater accuracy of steering on the forms. | Vibrator for joints can be plugged in on the finisher, eliminating the need of a separate generator. |
| Easier on the road forms. | Smoother and truer finish of slab. |

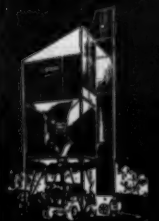
These and many other points of performance and convenience have been demonstrated conclusively in the field under a great variety of paving conditions.

If you wish further details of the Blaw-Knox Gas-Electric Road Finisher, send for Blaw-Knox Catalog No. 1507.

BLAW-KNOX COMPANY
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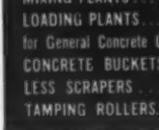
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PLANTS



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TRUCK MIXERS



ROAD
FORMS



Blaw-Knox Road
Finishers are also
furnished in the
gas engine driven
type—when de-
sired.

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gregates and Cement ... CENTRAL
MIXING PLANTS ... TRUCK MIXER
LOADING PLANTS ... STEEL FORMS
for General Concrete Construction ...
CONCRETE BUCKETS ... BOTTOM-
LESS SCRAPERS ... SHEEPSFOOT
TAMPING ROLLERS.



Part of the Equipment Show Display in Allis-Chalmers New Addition to Their Plant at Springfield, Ill.

A-C Opens Million-Dollar Plant Addition with Show

The opening of the new Allis-Chalmers million-dollar addition to its Springfield, Ill., plant was the occasion of a three-day sales conference and equipment show in March. Over 700 dealers, dealer salesmen and company men attended.

A half-million dollar display of Allis-Chalmers tractors and allied equipment was one of the high-lights of the meeting. Of special interest was the company's new 64-hp Model S-O controlled-ignition oil tractor, features of which are higher speeds, constant mesh transmission, truck-type gear shift, roller bearing tracks and controlled alignment of tracks. Some of the allied equipment shown included Continental two-wheel scrapers, Gar Wood four-wheel scrapers, bulldozers and roadbuilders; Baker bulldozers, gradebuilders, road discs, rosters and snow plows; Century dual-control graders; Ateco scrapers, hydraulic and cable roadbuilders, and sheepsfoot rollers; Blaw-Knox bottomless scrapers; Knapp hydraulic scrapers, rippers, hydraulic pumps and dump bodies; Isaacson winches, Hughes Keenan Roustabout cranes; Harnischfeger V-type sidewalk snowplow; Hough Loader-Digger and transport buggy; and Trackson pipe booms and wagons.

The new plant addition, which doubles the company's production capacity on track-type tractors, is modern in every respect. Four production lines are now in operation, one for each of the L, K, S and M models.

Slee Joins A. R. B. A.

The appointment of W. C. Slee, of Baltimore, Md., as Assistant Engineer-Director, has been announced by the American Road Builders' Association. Mr. Slee has served as construction engineer with several leading contracting organizations in Pennsylvania, operating in that state and in Maryland and West Virginia; was for three years City Engineer at Hagerstown, Md.; and more recently has been associated with one of the large road-building materials companies.

Mr. Slee will work in collaboration

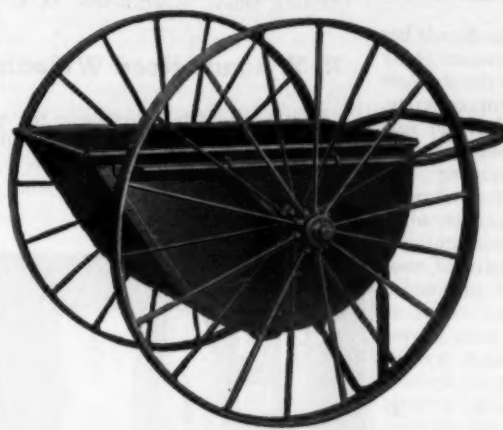
with all the groups affiliated with the highway program as sponsored by the A.R.B.A. and will meet personally city, county and state officials, contractors and others connected with the construction industry, in order that they may share in the activities of the Association.

Blaw-Knox Buys Power Piping

The Blaw-Knox Co., of Pittsburgh, has acquired the property and business of the Power Piping Co., also of Pittsburgh, W. P. Witherow, President of Blaw-Knox, announced recently. The Power Piping Co. was organized in 1916 and has been engaged in the design, manufacture and erection of piping for power plants, oil refineries, sewage plants, water works and industrial plant use. In 1934, a sprinkler division was added.

The business will now be operated under the name Power Piping Corp. William V. Quartz will continue in charge.

STERLING No. 6 CONCRETE CART

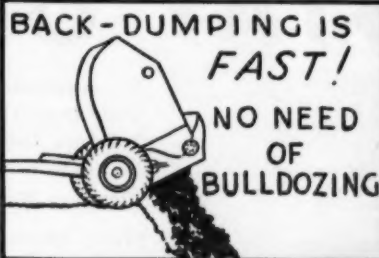


Sterling No. 6 Cart

6 cu. ft. capacity
42" dia. wheels
12 gauge tray
Malleable Trunnions
With Plain or Roller
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A COMPLETE
LINE OF STERLING
WHEELBARROWS
AND CONCRETE
CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.



At right is shown a Continental Wagon Scraper dumping a load over the edge of a bank, between a sewer and a retaining wall—only a Continental can do it!



Exclusive— Back-Dumps Like a Truck!

8 other Continental features:

1. Lightest in weight, yet strongest!
2. Simplest in design and all working actions!
3. Require less tractor power!
4. Backfill entirely over a bank!
5. Dump in close quarters!
6. Turn short and back easily!
7. Load, dump and haul faster!
8. Used for spreading and grading, too!



An exclusive feature of Continental Wagon Scrapers is their fast, clean, back-dumping behind the wheels like a truck. The fastest method of filling without the need of bulldozing.

Two-wheeled design provides for greatest stability, allows for short turns, and with the back-dumping feature makes a simple matter of back-filling entirely over the edge of a bank, into water, around culverts or against retaining walls. No other Wagon Scrapers are as flexible in operation as Continentals!

They scoop, load, haul, carry and dump anything the tractor will pull through: dirt, clay, rocks, tree roots and other embedded obstructions—faster and at less cost. They meet all grading specifications of today, without the need of auxiliary equipment.

Made in 5, 7 and 10 yard capacities for use with all sizes of crawler tractors, mounted on rubber-tired wheels or crawler tracks.

Speed up your operations—avoid breakdowns and delays—minimize your digging and hauling costs—use Continental Wagon Scrapers!

Let us give you operating cost details on any of the hundreds of profitable Continental installations!

Sold and serviced by Allis-Chalmers dealers everywhere.

CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
Railroad Ave., East Chicago, Indiana

USE RIGHT BUCKET FOR THE JOB



Hayward makes all four—clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.



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HAYWARD BUCKETS

CONTINENTAL WAGON SCRAPERS

Effect of Vibration On Pavement Concrete

The U. S. Bureau of Public Roads has recently completed an extensive study of the effect of vibration on the strength and uniformity of pavement concrete. In this investigation the effects of surface vibration on pavement concrete were measured by comparing the strength and other properties of vibrated concrete with similar properties of a standard-finished base mix containing 6 sacks of cement per cubic yard of concrete and sufficient water to produce a slump of $2\frac{1}{2}$ inches. Two types of coarse aggregates, a typical river gravel and a typical limestone, and several forms of surface vibrating equipment were used, including vibrating screeds and vibrating pans resting directly on the concrete. The vibrating equipment used was that made by the Jaeger Machine Co., the Blaw-Knox Co., and Baily Vibrator Co.

In the vibrated concrete the proportions of the base mix were varied for the purpose of determining: 1, the saving in cost that might be possible through a reduction in cement content while maintaining the water-cement ratio constant; and 2, the improvement in quality that could be effected by reducing the water-cement ratio while maintaining the cement content constant.

The results of these tests have recently been reported by F. H. Jackson, Senior Engineer of Tests, and W. F. Kellermann, Associate Materials Engineer, of the U. S. Bureau of Public Roads. The conclusions drawn from the test results indicate that:

1. For a given water-cement ratio a saving of approximately 10 per cent in the amount of cement can be effected by the use of vibration without sacrificing strength and uniformity.

2. For a given cement content an increase in flexural and compressive strength of approximately 10 per cent can be obtained by the use of vibration.

3. With the methods of surface vibration investigated the best results will be obtained with concrete having a consistency corresponding to a slump of approximately 1 inch.

4. The uniformity of concrete having a slump of approximately 1 inch, that is, freedom from segregation, honeycombed areas, etc., is markedly improved by surface vibration.

5. The effect of surface vibration on strength and uniformity seems to be about the same for concrete containing gravel as coarse aggregate as for concrete containing crushed stone.

6. The vibrating screed and the vibrating pan mounted independently of the screeds seem to be about equally effective in producing the results enumerated in these conclusions.

The practical application of these findings is important to highway engineers and contractors. Depending upon the objective sought, existing specifications for pavement concrete may be modified to utilize vibration to advantage in either of the following ways:

1. By providing for adjustment of proportions to give a slump of approximately 1 inch with the same net water-cement ratio as is used in standard construction.

2. By providing for adjustment of proportions to give the same cement content as is used in standard construction but with the slump specified at 1 inch instead of $2\frac{1}{2}$ inches.

In either case the specification should be worded so as to permit the engineer to vary the relative proportions of fine and coarse aggregate to produce the best results, depending upon the type and grading of the aggregates used and the type of finishing equipment employed.

The complete report of these tests appears in *Public Roads*, Volume 18, No. 2, April 1937, published by the U. S. Bureau of Public Roads. Copies may be

secured at 10 cents each in coin, not stamps, from the Superintendent of Documents, United States Government Printing Office, Washington, D. C.

N. Y. Roads Need Widening

New York State, possessing the most people, the most motor vehicles and the most heavily traveled roads, has 1,617 miles of roads requiring widening, ac-

cording to E. C. Lawton, Assistant Commissioner of Construction, Division of Highways.

"By 1940, 1,617 miles of the state system should be widened to three lanes and 929 miles to four lanes," said Mr. Lawton. "When it is considered that there are only 770 miles of three-lane pavement and 229 miles of four-lane pavement in the state, the magnitude of the problem which confronts the Department of Public Works can be realized."

Salt-Stabilized Roads

The latest issue of Recommended Specifications for Salt-Stabilized Roads, published by the Morton Salt Co., Morton Bldg., Chicago, Ill., has just been announced. Copies of this bulletin as well as copies of the Construction Manual and a booklet on salt-stabilized base courses for bituminous surfacing may be secured upon request by mentioning this magazine.

GAR WOOD HOISTS AND DUMP BODIES

Built to STAY ON the JOB!



Above: C12 body and D6 hoist unit for $1\frac{1}{2}$ -2 ton trucks. One of many standard body types available.



Left: 8 cu. yd. rock body with automatic downfolding tailgate that opens when body angle is 18°. Note T44 telescopic hoist, mounted outside truck frame.

For equipment that can start the job—and finish it—your choice should be Gar Wood. Contractors and road builders the world over prefer Gar Wood hoists and bodies—not only because they stand up, but because they are available in any type and size the job calls for.

These illustrations show but a few typical units. For information on the complete line, write for the various bulletins which are available.

Branches and distributors in all principal cities.

Right: 5 cu. yd. W12 body and F4C cam and roller hoist installed on $1\frac{1}{2}$ ton chassis with 6-wheel axle attachment.



Model F4C cam and roller hoist and W12 body—the standard dump equipment of thousands of truck operators.



Above: Combination dump and platform body, type C1-D, installed with D6 hoist.



Above: This shows the C1-D body converted to a platform, when sides and tailgate are downfolded. Stake pockets are provided. Note the Gar Wood winch, which really makes this an all-purpose unit for any contractor.



2-way side dump unit, with T2 telescopic hoist, for maintenance work.

GAR WOOD INDUSTRIES INC.

HOIST AND BODY DIVISION—DETROIT, MICHIGAN

A New Small Shovel

Model 20, a fully-convertible $\frac{5}{8}$ -yard excavator recently announced by the Northwest Engineering Co., 1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., is similar in design to the recently announced Model 25. The bases are of cast steel, the side frames are cast integral with the rotating base, travel gears are fully enclosed and the whole crawler design is engineered and built

exclusively for shovel service.

Features of this new excavator are its speedy operation, feathertouch control, and the cushion clutch. The swinging clutches are of the cone type. Ball or roller bearings are used on all the high-speed shafts. The power take-off is through helical gears running in oil in an oil-tight housing.

Power is furnished by a Wisconsin 6-cylinder gasoline engine and electric or diesel power is optional.

A New Jackhammer

Ingersoll-Rand Co., 11 Broadway, New York City, has just announced a new 55-pound Jackhammer called the JA-55. It is a hard-hitting, fast-drilling tool for harder rock and deeper holes in quarry and contract work. Having a low air consumption, because of improved valve design, it is especially useful with portable air compressors and where the air supply is limited.

A.S.T.M. Corrosion Tests End Twentieth Year

At Annapolis, Md., last October, the American Society of Testing Materials celebrated the twentieth anniversary of its Atmospheric Corrosion Tests on black iron and steel sheets which were exposed at Annapolis in 1916. The original series of tests, which started twenty years ago, included identical sets of test specimens exposed to the industrial atmosphere of Pittsburgh, the rural and light industrial atmosphere at Fort Sheridan, Ill., and sea coast type of atmosphere at Annapolis. About 485 specimens of No. 22 and No. 6 gage sheets were exposed at each location.

The Pittsburgh tests extended over a period of six years and three months during which a large number of failures developed in the specimens. The Fort Sheridan tests covered a period of 11 years in which 127 of the 219 specimens of No. 22 gage failed and four of the 260 No. 16 gage specimens. At Annapolis, there have been no failures reported on the No. 16 gage specimens, but about 60 of the No. 22 gage have failed.

The chief feature of the selection of the specimens used in the tests was that some of the samples contained added copper and a considerable number were non-copper-bearing or had low-copper content. The experiments demonstrated quite conclusively that steel sheets containing up to about 0.2 per cent copper offer a distinct increase to resistance to atmospheric corrosion as compared with sheets with little or no copper when they are both exposed freely to the atmosphere.

The American Society for Testing Materials reports that as a result of the information developed in these tests various American industries have benefited greatly from the use of the so-called copper-bearing steel. These atmospheric experiments have shown the value of phosphorus as an alloying element, although this observation has not been so widely circulated as was the information on copper. Phosphorus and copper together in steel produce more resistance to atmospheric corrosion than does copper alone. Phosphorus in steel was always regarded as harmful, and something to be avoided with great care.

Three of the original members of the subcommittee in charge of these tests have continued actively in the work throughout 20 years of their duration. These members are Messrs. W. R. Fleming, Metallurgical Engineer, The Andrews Steel Co., Newport, Ky.; M. E. McDonnell, Chief Chemist, The Pennsylvania Railroad Co., Altoona, Pa.; H. E. Smith, Materials Engineer, White Plains, N.Y.

In addition the present committee includes E. S. Taylerson, Carnegie-Illinois Steel Corp., Pittsburgh, Pa., as Chairman and F. H. Frankland, Chief Engineer, American Institute of Steel Construction, New York City; J. R. Page, Chief Material Inspector, Norfolk & Western Railway Co., Roanoke, Va.; R. F. Passano, Research Engineer, American Rolling Mill Co., Middletown, Ohio, and a representative of U. S. Navy, Bureau of Engineering and Naval Engineering Experiment Station, Annapolis, Md.

Complete Conveyor Catalog

A new catalog on Rex belt conveyor equipment and engineering data, containing complete and specialized information on the design and application of belt conveyors for handling all bulk materials, with a full listing and description of all belt conveyor equipment has just been published.

Copies of this new catalog may be secured free from the Chain Belt Co., 1666 West Bruce St., Milwaukee Wis.

ROAD MACHINERY

GAR WOOD



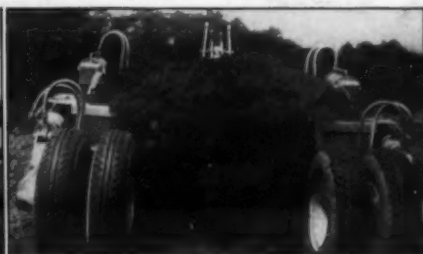
Gar Wood Scrapers will dig and load, lift and carry, dump and spread, in any kind of soil. 4 sizes available.

GAR WOOD bulldozers, trailbuilders, hydraulic scrapers and other road building equipment, are engineered and built by men who have had long experience in this field. A very complete line, comprising a full range of sizes in the various units, is available to suit any type of job or tractor equipment. Write for individual bulletins.

Write for information about Gar Wood Truck Tanks and Mead-Morrison Winches, Cranes and Pole Derricks, built in a complete line.



Ability to shorten or lengthen the wheelbase is an important feature.



Evidence of full capacity loading. Ask any operator about Gar Wood performance.



3 point suspension permits the big scraper to follow anywhere the tractor leads.



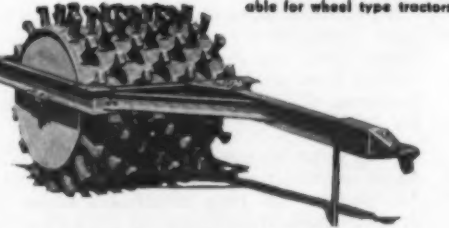
Gar Wood bulldozers and trailbuilders are built in many sizes to fit standard track-type tractors. Their mounting method saves vital tractor parts from shock and strain. Gar Wood hydraulic jacks and controls provide quick, positive blade action.



Gar Wood snow plow attachments are available for Gar Wood moldboards. Also special crosswalk snowplows available for wheel type tractors.



Road ripping, tearing up pavings, digging roots and rocks, are easy and fast operations with the Gar Wood Ripper. Adjustable depth control and self cleaning standards are features of this rugged equipment. Three sizes available.



Sheep's Foot Tamper, used for compacting earth fills. Electrically welded steel drum. Can be used singly or in multiple units.

GAR WOOD INDUSTRIES INC.
ROAD MACHINERY DIVISION — DETROIT, MICHIGAN



A Safety Engineer Testing for Gas In a Chicago Sewer Tunnel

Some Safety Practices On Sewer Construction

(Photo on page 56)

The largest sanitary engineering program in history, which is now being rushed to completion by the Sanitary District of Chicago, has created more than 12,000,000 man-hours of employment at construction sites. One of the problems on a project of such magnitude is the safety of the workmen.

Every precaution is being taken to insure the safety of the employees as they labor to construct the 72 miles of sewer tunnels which are part of the \$135,284,000 job. Safety men and specially trained rescuers are constantly on the job, making periodic tests of the gas content of the tunnels, supervising methods, and ready to swarm into any portion of the tunnel where an accident might occur. The gas content of every section of the tunnels which are being dug 40 feet beneath Chicago's streets are tested several times daily. Work goes on 24 hours a day, and every shift has its crew of safety men trained in mine rescue work.

When the project, which includes also the construction of several sewage treatment plants, is completed, no sewage will flow into any of Chicago's rivers or canals, thereby making it unnecessary for the metropolis to divert water from the Great Lakes to flush its waste down the river. The Sanitary District, with \$58,630,000 in loans and grants from the Public Works Administration, has already reported that it will be prepared by December 31, 1938 to reduce its diversion for sewage dilution from Lake Michigan to 1,500 second-feet.

New Hot or Cold-Patch Bituminous Mixer

A 6 and 10-cubic foot mixer for handling hot or cold-patch bituminous mixtures for surfacing and maintaining roads, airport runways, and similar uses, has been announced by the Ransome Concrete Machinery Co., Dunellen, N. J. With this new Ransome mixer, it is possible to heat and obtain a thorough and uniform mix of sand, pit-run gravel, crushed rock, as well as any patented bituminous patching material.

Two large steel paddles, using the Ransome method of kneading and stirring, revolve at 26 rpm to mix the material. The drum is designed for easy cleaning and controlled heat is supplied by a 10-gallon capacity fuel tank and improved type Littleford burner.

These mixers are available in two sizes, 6 and 10 cubic feet, mounted on trailers with steel or pneumatic-tired roller bearing wheels with coil springs. The unit can be moved from job to job by means of a handling and pulling bail with a large handle so that a man can put two hands into it when pulling it into position.

Interesting Booklet On Diesel Engines

A well-illustrated booklet of 72 pages, describing and depicting various types of construction and industrial equipment

powered with diesel engines, has recently been issued by the Cummins Engine Co. The story of the adoption of diesel power not only in the construction industry, but in logging camps, on tugs, fire boats and commercial organizations, is related and illustrated with an unusually inter-

esting series of photographs.

Copies of this booklet entitled "The Dependable Diesel" may be secured gratis direct from the Cummins Engine Co., 600 Wilson St., Columbus, Ohio, by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

BIG

ROGERS BROS. CORPORATION
ALBION PENNA.

OR SMALL

There's a ROGERS to fit every trailer need

Sizes 5-100 tons

Write for illustrated Catalog



HEAVY DUTY HAULING DEMANDS REAL HEAVY DUTY EQUIPMENT

Contractors, quarry operators, dirt movers, in fact the entire field of heavy dump truck movers, recognize the superior features of Hug transportation equipment, because Hug offers a real heavy duty transportation unit.

Hugs are built throughout with extra heavy duty truck units, including massive arc welded I-beam frames, powerful heavy duty truck engines, rugged axles, transmissions, and springs. All the way through, Hugs are completely designed to operate profitably on the toughest jobs.

Hug Roadbuilder chassis and dump bodies are engineered and built as a completely balanced, integral unit. This heavy duty construction, balanced load distribution, short wheel base and turning radius together with Hug special features of design puts Hug in a heavy duty hauling class by itself.

Bring your transportation problems to Hug, for whatever your requirements there is a Hug unit that will lick them profitably. Let Hug engineers show you why the superior transportation features of Hug Roadbuilders will greatly reduce your hauling costs.

THE HUG COMPANY
514 Cypress Street HIGHLAND, ILL.

BUILT TO MEET A CONDITION



Model 87Q Hug Roadbuilder. Equipped with 6-yard Hug Sloop End Body and high dumping angle hoist, especially engineered for dirt and rock hauling.



Model 87Q Hug Roadbuilder. With 6-yard Eastern Phoenix Side Dumping Quarry Body. Designed particularly for quarry service.



Model 97L Hug Roadbuilder. Equipped with 8-yard Hug Rock Body and down folding tail gate—for dirt and quarry operations.



Continental Wagon Scrapers Now
Equipped with Crawlers

Wagon Scrapers Mounted on Crawlers

Announcement has been made by the Tractor Equipment Division of the Continental Roll & Steel Foundry Co. that its line of wagon scrapers is now mounted on crawlers. The manufacturer claims that this increases the usefulness of these wagons by making possible their use a greater part of the wet season, allowing their operation in wet soils and under conditions which would be practically impossible for wheel-type scrapers.

All sizes of Continental wagon scrapers, 5, 7 and 10-yard models, are available with crawler units. The crawler unit for the 10-yard wagon is available for field replacement on the Continental wheeled wagon scrapers now in the field.

Descriptive literature on all models of these wagons may be secured direct from the Continental Roll & Steel Foundry Co., Tractor Equipment Div., East Chicago, Ind.

Highway Program Would Eliminate Unemployment

A highway construction program adequate to the country's needs would absorb all the available unemployed labor, as well as remove road hazards which cost thousands of lives a year, according to John T. Flynn, noted economist and automotive engineering expert, who recently completed a national survey for *Collier's* magazine.

In spite of the fact that we have the best highways in the world, there are neither enough of them nor are the ones we have adequate to meet the demands of modern traffic. Mr. Flynn pointed out that one need not be a road engineer to realize that roads built originally for a nation of eight to ten million cars going 20 to 40 miles an hour are not suited to a nation of twenty-six million cars rushing over the highways at 50 to 60

miles an hour.

Before such a program can be launched, however, the highway revenues from gasoline and motor vehicle taxes and fees must be invested in the highway construction and maintenance for which they are being collected and motor tax diversion must cease. Mr. Flynn says,

"It would be difficult to use these funds on a sounder project. For while we go forward with the perfection of our road system we not only provide commerce and the population with a better instrument of transportation but we at the same time provide employment in an important group of industries—since about 90 per cent of the road dollar goes into labor—and we press forward the great campaign for driving safely which has gripped the country's imagination."

There are some 1,000 miles of highways in England well illuminated with no fewer than 30,000 mercury vapor units.

South Bend

Bituminous Material Distributor

EMBODYING 29 YEARS' EXPERIENCE

ECONOMICAL • EFFICIENT • STURDY
NON-DRIP SPRAY BARS • QUICK SHUT-OFF
ACCURATE APPLICATION • IMPROVED HEATING

MUNICIPAL SUPPLY COMPANY
SOUTH BEND • INDIANA

BEVERLY IMPROVEMENT MOVES THE *Mountain* TO *Mahomet*

● Sand along Chicago's lake front will not support the beautiful parks the city is building. But the tons of black soil in the hinterland will—so the Beverly Improvement Company is hauling this rich black land to Chicago's West End Parks.

First a giant ripper, drawn by a Cletrac goes over the ground, followed by diesel Cletracs and five yard scrapers which strip the soil, carrying it to the dumps.

From the dump a steady stream of trucks transport the earth to the parks to become a foundation for beauty.

Hour after hour—day after day—in tough gumbo—sand—rocky and stumpy soil—Cletracs have the power and maneuverability to outperform on low cost earth moving. In Cletracs you have your choice, too, of either gasoline or diesel power—you can select the power that will suit you best.

THE CLEVELAND TRACTOR CO. • Cleveland, Ohio

Only Cletrac Has the Advantages of Controlled Differential Steering

Full traction and power on both tracks when turning. Tractor turns in shorter radius with maximum load. All steering mechanism works in one common bath of oil. Simpler—safer operation...Easier control...lower maintenance cost.

BARGAINS in Construction Equipment

The directors of the Middle Rio Grande Conservancy District have authorized us to offer the last of their construction equipment, made available by completion of the construction work, at bargain prices. This equipment is all in good condition and includes

50B Bucyrus-Erie
Diesel Draglines
775 P & H Diesel Draglines

pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, Inley concrete placing outfit, concrete heaters and vibrators, gravel screening plants, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar benders and cutters, carbide floodlights and other items at bargain prices. Wire or write for complete list and prices

R. L. Harrison Co. Inc.
Albuquerque New Mexico



CLETRAC CRAWLER TRACTORS

Handling Traffic On Canyon Road

(Continued from page 1)

week and two day shifts of 6 hours and 40 minutes.

The use of 40 per cent dynamite with the holes loaded lightly with Gold Medal dynamite prevented any trouble with the complete closing of the road for more than a few minutes at a time immediately after shooting. The state engineers permitted the shooting of only short sections at a time, the average being about 40 feet which was readily cleared by the shovel in 15 minutes. The section was shortened if it seemed possible that the rock might throw badly. The contractor was able to clear the road for one-way traffic in an average of 10 minutes. The maximum time was 30 minutes.

A Bucyrus-Erie 1½-yard gas shovel worked on another section of the job and a Caterpillar Fifty diesel with a Le-Tourneau bulldozer handled the rapid moving of rocks in the clearing of sections where the shovel could not completely clear the roadway for traffic as fast as desired.

Changes in Alignment

In the location of this highway for reconstruction the engineers made a deliberate change which while not a marked improvement in alignment did result in a more favorable attitude toward the road on the part of one community and also dodged a dangerous winter condition. Just east of the city of Idaho Springs, Colo., is the only level piece of ground for many miles, and the townsmen, being baseball minded, created a municipal ball park there and the game has thrived. The location engineers of the state spotted the level section and plotted the road right through the middle of it. In the field the location was changed slightly to dodge the park and avoid the necessity of moving a power line tower, and still maintain a fairly good alignment.

In another place the road had been located along the right bank of a stream where a wooden pipe line for a partially abandoned hydro plant was located. The roadway ran immediately below the pipe line which leaks during the entire year but during the winter the effects are worse as the water freezes and makes the road impassable with any degree of safety. By placing the road on the opposite bank of the stream this hazard was avoided. It also involved a channel change of 600 feet in coarse gravel and boulders.

The completed road is 34 feet wide at the top of the finished gravel and with a 3-foot ditch section on hillsides. The contractor started the work on June 3,



C. & E. M. Photo
Drilling a Cliff High Above the Old Roadway for Relocation

1936 and the contract period ended October 15, 1936, with a \$100 a day liquidated damages penalty for each day worked thereafter. The first operation was to clear completely and grub the right-of-way before traffic picked up for the summer. Then he went to removing the rock ledges that were required by the contract before the easier operations were started.

Major Quantities

The major quantities on this 3.503-mile project, FAP 181-A reopened and 181-E were:

Unclassified excavation (about 25 per cent solid rock).....	188,200 cubic yards
Dry excavation, rock, for structures....	420 cubic yards
Dry common excavation, structure....	1,300 cubic yards
Wet rock excavation.....	50 cubic yards
Wet common excavation.....	150 cubic yards
Station-yards overhaul (free haul, 500 feet).....	583,000 station-yards
Yard-mile overhaul (applies after 1,600 feet of haul).....	1,600 yard-miles
Crushed gravel surfacing.....	21,000 tons

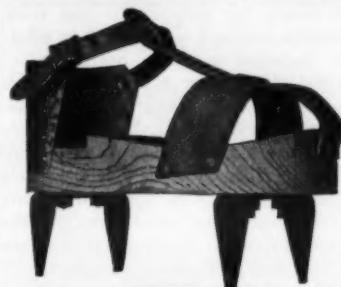
Personnel

The contractor for this work was the M. E. Carlson Construction Co. of Denver, Colo., for whom Walter Sabin was

Superintendent and Fred Bacus was Powder Superintendent. C. G. Schoech was Resident Engineer for the Colorado

State Highway Department until his untimely death on July 20. He was succeeded by Al Ferguson.

NEW! DAVENPORT PAVER'S SANDAL LEAVES NO FOOTPRINTS.....



THIS new Davenport Wood Sole Shoe is ideal for asphalt workers. No shoe impression is left in the asphalt because the 3-inch spikes contact the concrete road base. The spiked prongs are securely fastened to flat-cut soles with two counter sunk bolts and lock washers. Recessed heels and curved soles give comfortable fit over regular shoes. Regular Paver's Sandals without spikes also available with curved sole, galvanized iron counter and adjustable in-step strap. Orders filled same day received. Low quantity prices!

FREE GUIDE Write today for Davenport Wood Sole Shoe Manual—your guide to economical foot protection for employees.

F. J. STAHLER SHOE COMPANY, Davenport, Iowa
World's Largest Exclusive Manufacturers of Wood Sole Footwear

BUILT TO GIVE More Swings per Hour..



Saves Time IN
TIGHT PLACES

..MOVE MORE YARDS PER DAY

As compact and nimble as a sub-chaser—as rugged and powerful as a dreadnaught—the half-yard Badger was designed with a single object in view... faster output.

There is no swinging counter-weight to slow down the starting and stopping operations. No cab to limit visibility of operator. Low center of gravity holds the Badger steady. Boom dipper and dipper stick of light alloy steel, internal expanding clutch drums with extra wearing surface, and 41 anti-friction bearings combine to hold down operating and maintenance cost. *The net result is a faster starting, faster swinging, faster stopping, faster digging unit that cuts digging time and costs amazingly.*

Get the full story of the Badger's outperforming characteristics... Its unusual stability... Its extra dumping height and reach... Its speedy portability to new jobs at truck speeds... Its convertibility for crane, drag line, trench hoe, or pile driver. Mail coupon.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

Austin-Western

The Austin-Western Road Machinery Co., Y, Aurora, Illinois

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Tell me more about the

☐ Badger Shovel

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☐ Roll-A-Plane

☐ Blade Grader

☐ Motor Sweeper

☐ Crushing & Washing

☐ Flats

☐ Elevating Graders

☐ 5-Yd. Scraper

☐ 12-Yd. Scraper

☐ Trail Cars

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SH 705

Name

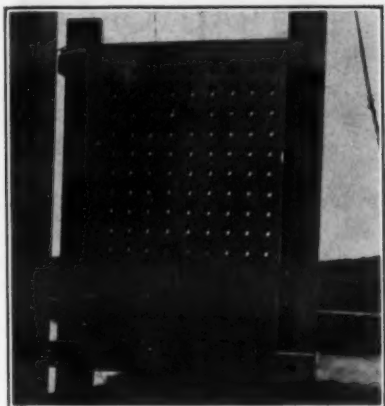
Address

City

State

How the Other Fellow Did It

Ideas Which Have Already Proved Helpful to Contractors



C. & E. M. Photo
The "Score Board" for Loads of Dirt Delivered to the Job

Keeping Score a la Cribbage

399. When a busy workman finds it necessary to keep track of a number of trucks delivering material to a given point, the score board shown in the illustration will be a big help. The photograph was taken on the Arthur A. Johnson Corp. contract for the hydraulic dike of the Swift River Project at Enfield, Mass. Truck load after truck load of material from the borrow pit was dumped into a hopper to be hydraulicked into place.

The spotter, by means of this punch board, could tell at any minute just how many truck loads of dirt had been delivered to the hopper since work started that morning. The upper portion of the board has ten rows of ten holes each taking care of 100 units. The lower section has three rows of ten holes numbered from 100 to 3,000 by one hundreds. The score on the board as shown is 226 loads.

Home-Made Barrel Cradles

400. A saving of 60 per cent was realized by a firm which decided to make its own cradles for barrels and drums instead of purchasing them. The cradles were fabricated from 1½-inch scrap angle iron, flame-cut to size, heated with the welding flame and bent, and then all joints oxy-acetylene welded. They have proved very satisfactory for handling 55-gallon drums.

Socket for Red Flag

401. It has been found hard to keep the red flag from jolting off moving equipment on rough roads, especially those used on graders. The simple holder shown here solved the problem for one fleet used by the Arizona State Highway Department. An old bearing ring was welded to the moldboard at the end, by a vertical and a horizontal brace, the latter bent to fit the slope of the moldboard and the former welded upright to the angle on the rear of the

board. Three 2-inch square headed bolts were welded by the heads, two of them supported by metal bosses welded on the ring, and coiled springs from an old auto slipped over the bolts, pressing upon the 8-inch section of 1½-inch tubing which holds the flag staff. These take up road shocks, while the bottom of the staff is held by a short set screw through the tubing.

Solving Mail-Box Problems On Rural Road Projects

402. What to do with the rural mail boxes during a construction job has been neatly and inexpensively answered by the Gifford-Hill Co., of Dallas, Texas, during the widening of a 4-mile section of busy Highway 80 west of Terrell, Texas.

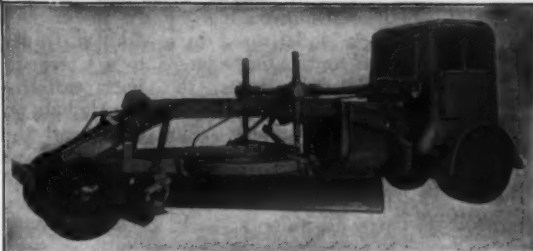
Instead of just uprooting the boxes and leaving the residents to get the mail as best they could, the contractor mounted the boxes with their posts, on concrete bases, 6 inches thick and 15 inches across the flats of the octagonal shape chosen.

Boxes and posts supported on these pedestals remain firmly upright, yet can be aligned on the undisturbed side of the highway during the construction work, and then replaced on their proper

sites when the paving has been completed.

Set into the earth shoulder with the top of the concrete base flush with the shoulder surface, the boxes and supports could easily be lifted and again set across the highway when regrading of the shoulders was needed, enabling this part of the work to be done entirely with power-graders instead of requiring hand work at each pedestal.

ROME DESIGN MATERIALS WORKMANSHIP



ROME DESIGN has been copied but never equaled. ROME MATERIALS are selected to conform to definite specifications. ROME WORKMANSHIP is first-class in every detail. DEALERS in principal cities.

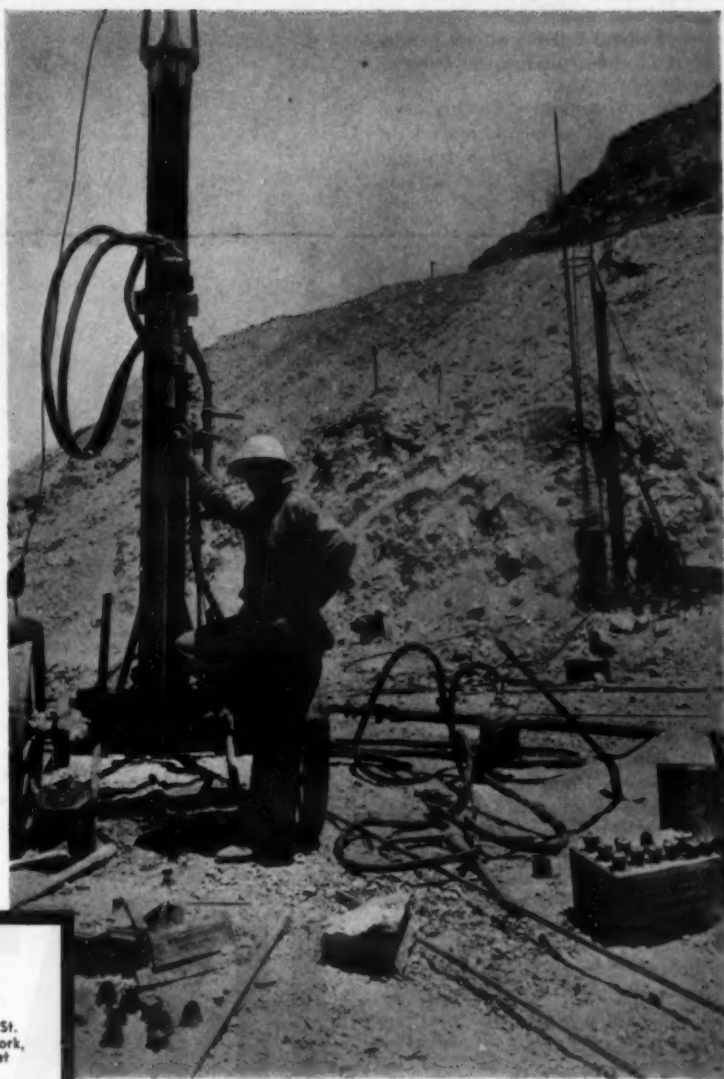
Bulletins on request
ROME GRADER AND MACHINERY CORP.
ROME, NEW YORK

Manufacturers of
"High Lift" Graders, Auto
Mowers, Motor Graders and
Snow Plows

6 OUT OF 7 WAGON DRILLS ON THE ALL AMERICAN CANAL ARE *Clevelands*

*I*N the rock cuts along the All American, six out of seven wagon drills are Clevelands. Selected because they drill faster, blow the holes better, and are so much more adaptable and so much easier to handle, Cleveland Drill Rigs have had an important part in excavating this big ditch that will furnish water for irrigating a million acres of fertile soil in the Imperial and Coachella Valleys of California.

The rock contractors on this immense project saved plenty of time and money by specifying Cleveland DR-6 and WDA-10 Drill Rigs for the 30 to 40 foot holes it was necessary to put down in the hard, ravelly, rock along the canal right-of-way. Let their selection of drilling equipment guide and help you in procuring drills for your own rock jobs. Bulletins 109 and 111 sent on request.



The cut in which this picture was taken necessitated the removal of nearly 600,000 cubic yards of hard rock. Two Cleveland Drill Rigs did all the primary drilling.

BRANCH OFFICES

Birmingham, Ala., 1304 1/2 North First Ave.	Negaunee, Mich. 222 Heath Street
Butte, Mont., 41 East Broadway	Newton, Mass. 457 Washington St.
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Los Angeles, Calif., 2001 Santa Fe Ave.	Richmond, Va., 12 North 15th St.
Martinsburg, W. Va., 100 South Raleigh St.	Salt Lake City, Utah, 501 Dooly Bldg.

THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT



Special Socket for Holding Red Flag on a Grader Blade

Imperial Dam

(Continued from page 2)

smoothed with a small Buffalo-Springfield roller before laying the reinforcing mat.

Before pouring the concrete, the projecting ends of the piles were chipped out with Ingersoll-Rand CC-4 air hammers, and the reinforcing cut to bond into the horizontal slab of the dam structures. One-inch square steel reinforcing was used in the base of the dam, 6 inches under the piers, and 1-inch round in the walls, spaced 12 inches both ways. Concrete was pumped by a Rex Pumcrete unit through an 8-inch line from a mixing plant near the river and placed with articulated metal chutes. This is supplemented on some pours by a Northwest dragline, lifting concrete skips from trucks which load at a larger mixing plant at the California end of the dam.

Abutment excavation which reached a maximum depth of 60 feet at Pier No. 1 of the All-American Canal headworks was done with a Northwest 2½-yard dragline, down to bedrock. None of the footings extend more than 15 feet in the rock, and were mostly dug with pneumatic chipping tools, loading the rock by hand into 1½-yard steel skips, which were hoisted by the Northwest. In the course of this work, as many as fourteen pumps were set up around the excavation, into which water poured at the rate of about 5,000 gallons a minute. Part of these pumps was reserve, in case of breakdown.

To dry up the abutment footing excavation in order to pour concrete in the dry, 150 linear feet of 4-inch drainage tile had to be laid in trenches around the edges, under this pier, and covered with a layer of coarse aggregates. The tile led into a drainage sump just outside the construction line at the deepest point. Two 4-inch pipes led from this to the surface. A two-stage American pump removed water from the sump through one of these. When the concrete had set, water was allowed to rise and about 400 cubic feet of grout was forced through the drains by means of these two pipes. Concrete was pumped from the mixing plant nearby, and placed with wooden chutes and articulated metal chutes. The concrete was consolidated with Viber, Mall and Ingersoll-Rand vibrators, aided by men in rubber boots.

In pouring the abutment and gate structures a truck-mounted Universal-Lorain 40 was used in handling the reinforcing and form sections. Tie rods with removable ends were used and left in the walls, the holes being grouted up after the concrete had set. Concrete from the 8-inch Pumcrete pipe line carried on a trestle overhead was placed with the articulated metal chutes. Compressed-air hammers were held against the forms on the outside during pouring to aid the vibrators used inside. Steel channels with flat anchor bars welded along the under side of each flange are set in the face edge of all slabs at expansion joints. A 1 x 4 is bolted to the top flange with brass bolts to form the key. A ½-inch strip of asphaltic

composition is used in the joint, and after both slabs have set the 1 x 4's are replaced by a strip of rubber, held down by two steel bars, the entire joint then being sealed with hot asphalt. The upstream slab is being poured as the dam structures are completed.

Aggregate and Concrete Plants

Washed sand and four sizes of aggregates are furnished for the dam and for the entire All-American Canal by the Triangle Sand & Gravel Co. and Charles Holmes under a separate contract. At the plant, about one mile down the river from the dam, a Lorain 75 2½-yard shovel loads trucks in the pit. Dumped through a grizzly, the coarser rock is delivered by a 48-inch feeder belt, on 12-foot centers, to a Universal gyratory crusher, the finer material passing directly to the 36-inch belt on 225-foot centers, which carries all the material to the top of the plant. Nine Stephens-Adamson shaker screens size the aggregates as they are washed by jets of water at each screen by water

pumped from a deep well by an 8-inch Crane pump. A Crow horizontal pump removes the dirt and silt through a 6-inch pipe with the waste water.

The aggregate loading bins are built with timbers laid flat to allow the water to drain out readily. About 250,000 cubic yards of aggregates are kept in stockpiles about 50 feet high and 1,000 feet long. The trucks pass over these on sectional wooden ramps. One Moreland 8-yard, two GMC 5-yard and twelve International 3½-yard trucks are used. The aggregates for the dam and desilting works are hauled in 3-yard Chevrolet dump trucks by Stringfellow Brothers, of Los Angeles, Calif. A Bucyrus-Erie 10-B shovel is used to load the trucks.

All concrete, except for the piling, is mixed in a central plant on each side of the river. For the dam structures, most of it is being pumped, but trucks will haul it to the desilting plant structures. The concrete plant near the Cal-

(Continued on following page)

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Special Equipment
Movable Bridge Machinery

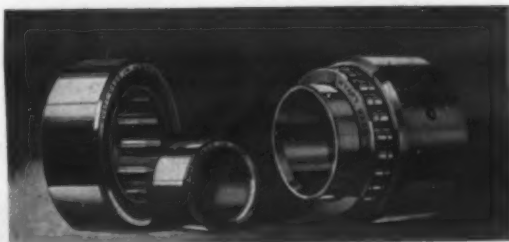
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P & H 1 1/2 YARD GASOLINE SHOVEL
built by Harnischfeger Corporation,
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TODAY's insistent demand for dependability in modern road building equipment is capably met by the indisputable advantages of fine workmanship and fine materials that identify every Hyatt Roller Bearing.

Built of the strongest bearing steel it is possible to procure...machined to microscopic tolerances which bring precision to the highest possible degree...every Hyatt has the exceptional ability to assimilate the gruelling punishment imposed by heavy loads and high speeds, while maintaining a constant and correct alignment of related parts.

Used in shovels, rollers, graders, mixers, and other equipment, Hyatts offer almost limitless possibility for economy in design and operation. Hyatt Bearings Division, General Motors Corporation, Newark, Detroit, San Francisco. Hyatt Roller Bearing Sales Company, Chicago and Pittsburgh.

USED ARC WELDERS FOR SALE AND FOR RENT

All types and sizes. Rebuilt,
also unreconditioned welders
at enormous savings.

Ask for free listing.

THE LINCOLN ELECTRIC CO.
Room 26 Cleveland, Ohio

Imperial Dam

(Continued from preceding page)

ifornia abutment has a capacity of 60 cubic yards an hour. It is an all-steel gravity-feed unit, with a 3,500-barrel silo for bulk cement. The cement is unloaded directly from railroad cars by two steel scrapers which deliver it to an enclosed elevator. Aggregates are dumped from trucks to the boot of a bucket elevator, which delivers them to bins at the top of the plant. Kron scales are used, with a 2-yard Rex mixer and a Pumpcrete unit of the same capacity. Cement and aggregates are trucked across a wooden bridge to the similar plant of 30-yard per hour capacity on the Arizona bank of the river. The capacity of the Arizona plant was increased to 60 cubic yards an hour in December, 1936.

The Desilting Plant

About three quarters of a million dollars now being spent yearly by the Imperial Valley Irrigation District for dredging operations is expected to be saved by the installation of the desilting plant below the dam. This plant will remove the heavier solids which have been settling to the bottom and sides of the irrigation channels. While the water may not be clear after passing through the plant, the remaining silt will be so light that it will not settle except when the water is still for long periods.

The water will pass into six desilting basins, constructed in pairs to operate simultaneously, through three influent channels, separated by concrete sheet piling, and water will pass to the outlet through four channels. An arrangement of gates permits by-passing water through the effluent channels without desilting. Each basin is 266 feet wide, 769 feet long and 14 feet deep. Each is being equipped with twelve Dorri clarifiers, revolving around their pedestals four times an hour. Silt will sluice out through sludge pipes, in the base of the pedestals, which converge into steel header pipes inside reinforced concrete galleries. Six of these lead from the basins to the sluiceway previously mentioned.

From 3 to 5 feet of silt was removed from part of the desilting basin area and wasted, using LeTourneau Carryalls, an Adams elevating grader and Euclid Trac-Truks. A rock hill near the center of the area, comprising about 600,000 yards, is being drilled with Gardner-Denver jackhammers driven by a compressor of the same make, and blasted. The rock is loaded by a 2½-yard Northwest shovel into dump trucks and hauled

to rock fills in other parts of the work. The banks of all channels in the desilting plant, including the main canal down to Station 50, are compacted with sheepsfoot rollers. The sides of the channels and walls of the desilting basins are compacted embankments, built up with selected material hauled from a borrow pit 2½ miles away, and ripped with 18 inches of rock placed on a blanket of 8 inches of selected pit-run gravel.

These embankments rise several feet almost over night, as the fleet of 12-yard dump-bottom Euclid Trac-Truks, owned by George W. Condon Co., of Omaha, Nebraska, subcontractor on this work, speed back and forth from pit to fill at 30 miles an hour, stopping only to receive a load, and making as many as 600 trips in two 7-hour shifts. Slowing down upon entering a fill, these units straddle the windrow to its end and dump without stopping, circle off the embankment and are away again. They are closely followed by a rock picker, of the revolving grizzly type, de-

veloped by Crook & Son of Los Angeles. A plow device at the front end scoops up a strip about 4 feet wide from the windrow and spiral baffle plates guide the rock over 5 inches in diameter over the elevated rear end of the grizzly into a hopper, which is emptied from time to time. The remainder of the material falls back to the windrow. The picker is operated by an auxiliary power unit mounted on one side but is pulled by an Allis-Chalmers tractor.

It is closely followed by another A-C tractor, with bulldozer attachment and pulling a Killefer disc harrow which levels the loose windrow into an 8-inch layer. Behind this is a third tractor with tandem sheepsfoot rollers which makes twelve trips to compact the material. The necessary water is added to the material at the borrow pit by scarifying the surface, throwing up borders with a bulldozer and ponding. Pressure jets are used to force water into the material in places where water is not taken up freely. A 2½-yard Northwest shovel is used to load the ma-

terial. The Euclid Trac-Truks travel over a smooth through highway, from which outside traffic is excluded, and which is carefully maintained by the subcontractor.

All equipment used by the George W. Condon Co. is equipped to burn butane gas because of the high summer temperatures at the dam site. There are thir-

(Continued on page 53)

**ROAD MATS
TARPAULINS
WINDBREAKS**

CONTRACTOR SUPPLY DEALERS in every state sell the FULTON LINE. Ask for SHUREBRY and FULTON Tents, Tarps and Windbreaks—anything made of canvas. Also Road Mats and Burlap. You buy quality products at fair prices when you buy the Fulton Line.

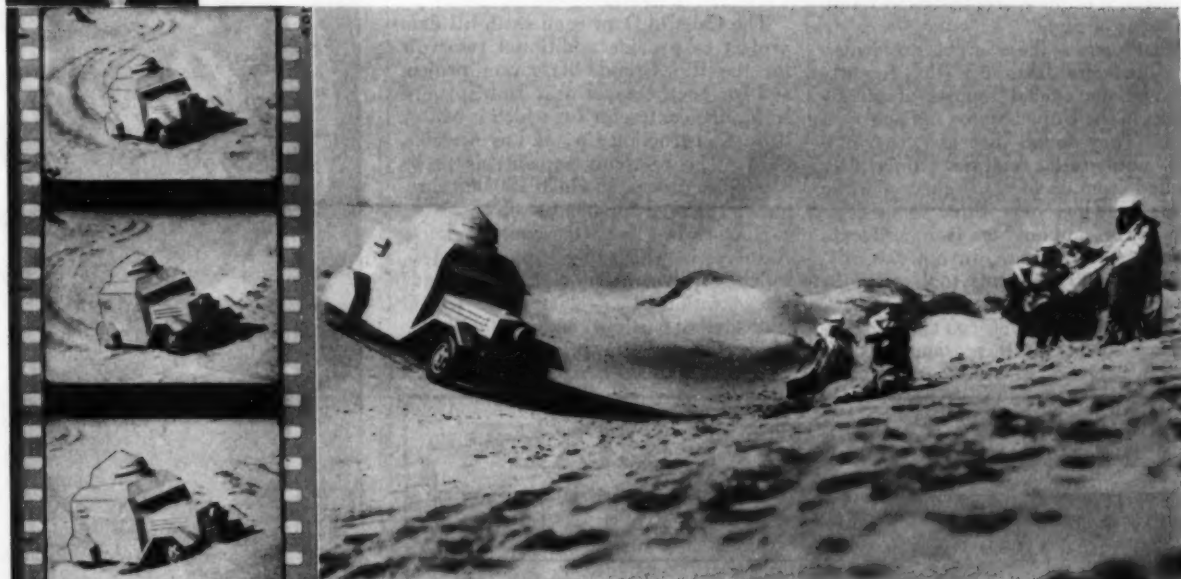
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"TROUBLE IN MOROCCO"

Armored Trucks Plow Through Scorching Sand, Hurtle Desert Dunes



GOODRICH SILVERTOWNS FIND REAL WAR IN FILM THRILLER

by Lowell Thomas

"Diving down the banks of steep sand dunes, skidding with two wheels in the air, roaring over the flat stretches—it's a tough job for trucks and tires."

"When they filmed 'Trouble in Morocco' they had plenty of trouble getting motorized equipment that could travel the 'camel country.' I've crossed the Sahara. I know what a job it is to get through with even a light passenger car, crawling along slowly. When you take heavy equipment, push the accelerator to the floor, plow through burning desert sand, it's torture for tires!"

"Believe me, there were plenty of thrills, hazards and perilous moments in making this picture."

"There was no place for sissies in the cast—and no place for 'weak sister' tires on the job."

Larry Darmour, producer for Columbia distribution of this feature picture starring Jack Holt, chose Goodrich Silvertowns for their armored cars. And many of Hollywood's largest studios use Goodrich Truck Tires for hauling cameras and delicate sound equipment. Where tires matter most, that's where you find Triple Protected Silvertowns.

Protects Against Blow-Outs

Every Goodrich Truck Tire has a new invention built into the sidewall—a 3-way check against blow-outs and side-

wall breaks. This protection actually checks 80% of premature failures! It strikes right at the cause of tire delays. Here's how it works:

- 1 **PLYFLEX**—distributes stresses throughout the tire—prevents separation—checks local weakness.
- 2 **PLY-LOCK**—protects the tire from breaks caused by short plies tearing loose above the bead.
- 3 **100% FULL-FLOATING CORD**—eliminates cross cords from all plies—reduces heat in the tire 12%.

With that kind of cool-running tire you're bound to get greater mileage on any kind of haul. Goodrich can give you the exact type and size of tire for your particular service—and there's no premium price to pay. Call the Goodrich dealer.

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ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE

"For me where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes.

For capacity comparison, ¼" cable used:

2-Ton "Lightweight"	75 ft.
5-Ton "General Utility"	250 ft.
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Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	\$50
5-Ton 4 & 24 to 1	110 lb.	\$75
15-Ton 4, 19 & 109 to 1	600 lb.	\$200

BEEBE BROS.

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Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U.S. Cities and Foreign Countries Gladly Mailed.

Goodrich Triple Protected Silvertowns

SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES

When, Where and Why Of Traffic Accidents

During the 12-hour period in which most of us spend at least six hours asleep in bed, 7,000 more people are killed each year than during the other 12-hour period when all of us are awake and traveling around the city or country, Dudley M. Diggs, of the General Electric Illuminating Laboratory, pointed out to members of the Association of Highway Officials of the North Atlantic States at their annual meeting in New York City in February. There were 33,000 more accidents during the daylight hours in 1935, but 7,000 fewer deaths. In other words, if you are in an accident at night, you are much more likely to be killed than if you are in a day accident.

National figures show that more than one-half of all fatal accidents occur after sunset, in spite of the fact that only one-fifth of the total traffic flows at night. Night driving is at least four times more dangerous than day driving, and on many highways it is from six to ten times more dangerous. That seems to answer fairly well the "When" of traffic accidents.

As to where these accidents occur, from 1930 to 1935, city fatalities declined 10 per cent, whereas deaths on the open road increased 28 per cent. A black mark on the safety records of all states is the accident and death rate on the main rural highways, and the preponderance of these accidents and fatalities occur at night.

What causes these night accidents? The Travelers Insurance Co. recently collected the official reports of all accidents in the United States and analyzed them. They found that of every hundred auto-crash fatalities, only two resulted from accidents occurring while it was snowing, only three from accidents in fog, and only ten from accidents while it was raining. In other words, 85 out of 100 accidents took place in perfectly clear weather.

Again all the blame can't be put on slippery roads, for these same records

show that 77 out of 100 fatalities took place on perfectly dry roads. Mechanical defects are not to blame for 92 per cent of all cars involved in fatal accidents were reported apparently in good condition.

Many surveys have shown, however, that inadequate visibility at night has greatly increased accidents. When permanent lighting systems were turned off along the Mount Vernon Highway leading into Washington, D. C., a few years ago, night accidents jumped two and a half times what they were. This has been the case wherever illumination has been turned off on highways.

The logical conclusions seem to be that there is a real need for greater night-safety on our highways; that the remedy is adequate visibility on the highways; and that the remedy is economically sound in high-night-accident areas.

Dealers Appointed by Haiss

Five new distributors for Haiss excavating and loading equipment have been appointed by the George Haiss Mfg. Co., Inc., New York City. These new dealers are the Smith Booth Usher Co., of Los Angeles, Calif.; the H. W. Moore Equipment Co., of Denver, Colo.; H. W. Taylor Co., Inc., Indianapolis, Ind.; T. D. Harter Co., Syracuse, N. Y.; and the West Virginia Tractor & Equipment Co., of Charleston, W. Va.

Progress on Caballo Dam On Rio Grande in N. M.

The Caballo Dam is an earth-fill dam project to provide additional reservoir for the Rio Grande irrigation project and for flood control near Hot Springs, N. M., the contractor for which is Mittry Bros. Construction Co., of Los Angeles, Calif. The reservoir capacity is to be 350,000 acre-feet, of which 100,000 acre-feet is reserved for flood control.

Starting last June, the contractor has 700 days in which to complete the job, which involves 1,960,000 cubic yards of excavation of all classes and 1,160,000 yards of earth fill and 198,000 yards of rock fill and riprap.



Building a Roadway Down to the Diversion Tunnel Entrance, Shown in the Background. The Platform Just Below the Tunnel Entrance is a Bridge on a Sea of Mud Over Which Trucks Could Not Pass to This Section of the Caballo Dam Project.

The equipment on the job includes two LeTourneau Type B 12-yard Carryalls, a LeTourneau roofer and a bulldozer powered by Caterpillar tractors. The scrapers are handling 250,000 cubic

yards of material.

In 14 days of two 8-hour shifts or 224 hours, operating on various hauls of about 600 feet, one scraper delivered 23,000 cubic yards.



★ Gardner-Denver WBF-210 Two-Stage Water-Cooled Air Compressor

...Water-Cooling PROTECTS the Air Supply

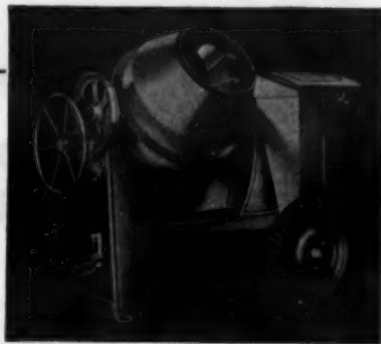
Trouble stays away from Gardner-Denver Two-Stage Portable Compressors—because they are WATER-COOLED for dependable operation, winter or summer. Completely water-jacketed cylinders also assure cooler air... fuel savings and oil economy... lower maintenance. Write for bulletins describing Gardner-Denver Water-Cooled Compressors in detail.

Since 1859

GARDNER-DENVER CO., Quincy, Ill.
GARDNER-DENVER

"Water-Cooled for Constant Load"

THE GREATEST MIXER VALUES!



New Streamlined Wonder Standard 3 1/2. Radically improved. The best small Mixer buy in the field.



2 Wheel End Discharge, fast mixing, fast moving Trailers, 5c-7s-10c.

No greater values in Mixers have ever been offered than in this new CMC Line. They lead the field in modern improvements—dependability and speed. They offer the contractor definite money-making advantages.

Get information on CMC Mixers all sizes—"Dump-over Pneumatic Tired Concrete Carts, Hoists, Pumps, Saw Rigs, Wheelbarrows.

GET YOUR CMC CATALOG

It shows the complete line of CMC Equipment.



CONSTRUCTION MACHINERY CO.
WATERLOO, IOWA

STANDARD

PORTABLE PAVING PLANTS

(ASPHALT AND PRE-MIX)

A REAL PORTABLE UNIT—MEETS THE REQUIREMENTS OF ALL STATES AS TO PERMISSIBLE WIDTH, HEIGHT, WEIGHT AND SIZE FOR HIGHWAY TRAVEL

**In actual use throughout the U. S.
(and Canada)**

More Profit for the Contractor!

Asphalt Paving bids figured with a STANDARD Portable Asphalt Paving Plant invariably receive the award. The reasons are simple enough: First, the STANDARD Plant reduces cost and speeds up operations; second, there is no huge outlay of money and time spent in plant erection.

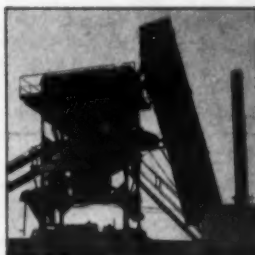
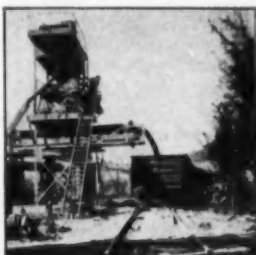
Check These Points . . .

- **Portability.** Plant can be knocked down and loaded for the road in one day.
- **Ease of Erection.** Simplicity itself . . . less time, less expense.
- **Capacity.** Greater daily feeding, mixing, and screening capacity.
- **Standard Parts.** Not a special casting or forging in any part. Only a few spare parts need be carried. Fewer working parts . . . removable and easily replaceable.
- **Low First Cost.** Less than many plants of far lower capacity. Greater output at lower cost over longer life.
- **Low Operating Cost.** Structurally correct and practical . . . conforming to Code of A.S.S.C. Direct Motor Drive. Only one man on operating platform.
- **Low Maintenance Cost.** All-Steel reinforced construction. Stronger yet lighter.
- **Lower Depreciation.** Low first cost and stronger, more durable construction reduce yearly depreciation. Fire Proof.

Write for
additional
Information

Northern California

A view showing a STANDARD plant in the material yard of the Basalt Rock Company, at Healdsburg, California, wherein bituminous materials are shipped in cars and trucks.



Idaho

Contractor Olaf Nelson has found the STANDARD portable plant has paid him handsome dividends. The plant has been moved from one job to another and has mixed a total of 300,000 tons. The last job was a 150,000 ton job on the Shoshone road, where the average was 2,600 tons per day, running in four 8-hour shifts. This is a 3,000-lb. plant.

New Mexico

Contractor Jack Casson has a 3,000-lb. STANDARD Portable Plant which he used at Hollywood, N. M., on a connecting link of the New Mexico State Highway.



Montana

Contractors, S. Birch & Sons Construction Co., Great Falls, Montana, have found it profitable to use two STANDARD portable paving plants which they have used on major Arizona State Highway work.

Utah

Contractor Harry Reynolds, of Springville, Utah, made excellent time in erecting this STANDARD Plant at Zion National Park, Utah, for the Bureau of Public Roads.



Arizona

In Arizona, Phoenix-Tempe Stone Co., Phoenix, has a 3,000-lb. STANDARD portable plant which they have used on major Arizona State Highway work.

Northern California

Contractors Betch Bros., Torrance, Calif., had a California State Highway job at 5,000 foot elevation. Here a natural pit provided the aggregates and cut back asphalt was used with this STANDARD plant.



Central California

Contractor Hanrahan Company, San Francisco, used this 3,000-lb. STANDARD full-automatic, electrically controlled plant and produced 1,500 tons in one peak day's run.



Texas

Contractors Brown & Root, Inc., believe the STANDARD portable plant the most economical plant to buy, as it can be shipped in assembled units. This photograph shows a 4,000-lb. STANDARD plant loaded on cars, ready for shipment to Texas.

Plants Like These Are Continuously Proving Their Superiority

STANDARD

STEEL WORKS

5001 Boyle Avenue

Los Angeles, Cal.

Three More States Join Anti-Diversion Movement

On April 5, 1937, Maryland's legislature decided to put an end to any chance for further misuse of its highway funds by passing a bill returning \$3,300,000 to its highway program, \$1,300,000 of which is already ear-marked for specific road projects. This money had been slated for diversion to balance the state budget and caused Maryland to be the first state to be penalized by the Federal

Government as provided by authority of Section 12 of the Hayden-Cartwright Road Act. Notified that one-third was to be sliced from its Federal-Aid apportionment, Maryland decided to reconsider and passed the bill restoring sufficient funds to its highway program, to eliminate imposition of the diversion penalty.

Nevada and South Dakota have also joined the march against the highway enemy—diversion. One of the last acts of these State Legislatures, before adjournment, was to pass measures to

amend their State Constitutions so that all highway revenues will be used only for the construction, maintenance and administration of highways.

On April 5, Governor Hoffman of New Jersey vetoed a bill which, if passed, would bring about the diversion of approximately \$7,000,000 in highway tax funds, intended for highway purposes, to the relief of unemployment in that state. In commenting on his action, Governor Hoffman said "A popular cry of the pro-diversionists has been 'Concrete or Bread'. The real issue is be-

tween a melodramatic slogan 'Concrete or Bread' and a sound policy that will provide both 'Concrete and Bread.' Our real obligation is to create jobs and opportunities to earn, not to perpetuate unemployment." However, on April 28, the New Jersey Legislature passed this bill over the Governor's veto, thus diverting about \$7,000,000 and subjecting the state to further loss of highway funds by a drastic reduction in the Federal-Aid money apportioned by the Hayden-Cartwright Act, under the penalty-invoking Section 12.



One county
after another
turns to

STANDARD ASPHALT ROAD OIL

THE demand is continually increasing for more and better secondary or farm-to-market roads. Farm trucks and pleasure cars need faster, safer, all-weather highways. The threatened exhaustion of the supply of mineral aggregate in many localities, because of the wastefulness of the unbound or loose aggregate surface, has placed a further demand for improved methods of construction.

As a solution, more and more state and county highway officials are turning to Standard Asphalt Road Oil. It is only natural. Oil-processed aggregate surfaces answer all their problems. They provide smooth, all-weather highways, conserve the supply of mineral aggregate, and, of most importance, give more miles of roadway per dollar.

Your local Standard Oil representative will be glad to give you construction methods and specifications for using Standard Asphalt Road Oil with the particular kind of mineral aggregate in your territory. Call him today.



*Asphalt for
every purpose*

STANDARD OIL COMPANY

(INDIANA)

IN SUNNY CALIFORNIA



One of the Five Bay City Shovels Owned by the California Division of Highways Excavating a Partly Frozen Earth and Rock Slide on a State Highway Near Redding. Mt. Shasta Is Seen in the Background.

Tractors Equipped With Pipe Layers

Caterpillar RD4 and R5 tractors are now available equipped with Trackson pipe layers, according to a recent announcement by the Caterpillar Tractor Co., Peoria, Ill. Three additional models of Caterpillar track-type tractors equipped with these pipe layers will be available in the near future, thus providing a complete line of these units.

These pipe layers lift, lower, carry and bend pipe and serve as side cranes for other heavy-duty lifting service. To obtain maximum lifting capacity with a minimum counter-weight, the operating mechanism is located on the side opposite the boom. Operation is simple with all control levers within easy reach of the driver. Simplified construction permits easy access to all parts of the tractor and gives the operator an unobstructed view of the work.

The entire structure can be removed easily and quickly when the tractor is to be used extensively for other work. In operation, the load and boom lines are raised and lowered under power by means of worm-driven winches, thus insuring safety and complete control of the load at all times. A selection of three speeds in either direction for both boom and load-line drums is provided by the special Trackson transmission and cross drive mechanism. A single lever

controls the direction of rotation of the drums, so that either can be raised or lowered separately or together, as desired.

Power for driving the pipe layer is from the Caterpillar rear power take-off through a ball-bearing-mounted friction clutch.

New Belt Conveyor Has Center-Guide Belt

A belt conveyor with a self-guiding belt, developed for low-cost long-distance transportation of materials, has been announced by the Link-Belt Co., 307 No. Michigan Ave., Chicago, Ill. The features of this new conveyor are a belt moulded with a continuous center guide strip on the underside, and the use of anti-friction conveyor idlers having a central roll with a deep groove within which the guide strip is confined in both runs.

Actual operation has shown that the belt maintains its central carrying position at all times, even when the conveyor is tilted sidewise at a considerable angle, thus making it unnecessary to use side guide idlers, according to the manufacturer. The center-guide conveyors can be furnished for any width of belt, and with double guides for the wider belts. The belt is known as the Philips Brand, having been named for the Link-Belt engineer who invented it.

An 8,600-Mile Highway

A nine-lane traffic jam, 8,600 miles long and extending completely around the United States, would occur if the more than 28,000,000 motor vehicles in the nation were brought together, bumper to bumper, on one road, according to a statement recently released by the U. S. Department of Commerce. Passenger cars would fill seven and one-half of the nine lanes and school buses would compose a column 455 miles long.

If all the agencies associated with motor vehicles were strung out along this 8,600-mile stretch, a dealer would be located every two blocks, there would be one or two service garages between each two dealers, and filling stations would be situated only 132 feet apart.

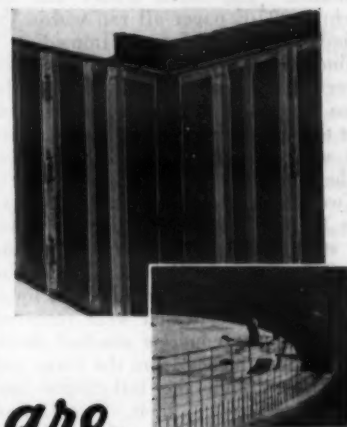
"There is only one thought I should like to add to the vivid picture," said Charles M. Upham, Engineer-Director of the American Road Builders' Association, in commenting on the Commerce Department's statement. "If all the money collected in gas-tax revenues and then diverted to purposes disassociated with highway building and upkeep during the past five years could be gathered together, dollar on dollar, at one time, just such a nine-lane super-highway, 8,600 miles long, around the country could actually be built. And, what's more, arrangements could be made to handle the 28,000,000 vehicles without congestion."

However, action is now being taken in a number of states to prevent further misuse of the funds collected for road work, by constitutional amendments outlawing diversion or by other legislation.

"It would seem," said Mr. Upham, "that, while legislation to date affects less than 25 per cent of the total number of cases, the efforts of the A.R.B.A. in fighting against the evils of diversion have at last begun to bear fruit and, even if a nine-lane super-highway is at present out of the question, there are existing today thousands of places immediately in need of good and safe two-lane highways."

The need for adequate highways was acutely felt in this country more than a century before the advent of motor transportation, for between 1808 and 1836, the Federal Government spent nearly \$7,000,000 to build the Old National Road, extending from the Atlantic Ocean to the Ohio valley and now known as Highway 40.

Uni-FORM ENGINEERS



are
**Sold On
SUPER-HARBORD**

More . . . more . . . More re-uses—that's what is selling contractors all over the country on the use of Super-Harbord Plycrete in the construction of concrete forms. It's one big reason, for instance, why the Universal Form Clamp Company uses Super-Harbord exclusively in building their UNI-FORM panels "for forming concrete walls quickly, accurately, and at a cost below other known methods."

Super-Harbord Plycrete is hot-pressed with a resinoid bond insoluble in water. Plies refuse to separate even after 30 to 55 re-uses—and are guaranteed not to separate.

Numerous other advantages, too, make Super-Harbord superior in concrete form work. Large panels make forms go up faster—at less expense. Smoother surfaces and tight joints minimize costly rubbing and finishing. Laminated strength resists stress and strain.

Start now checking up your construction costs.

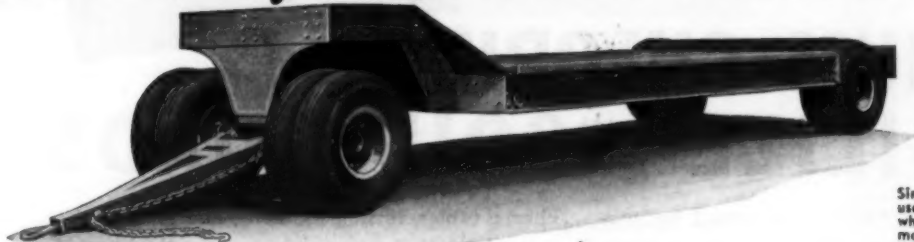


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Communications addressed to Harbor Plywood Corporation in any of following cities will receive prompt attention:

BRANCHES: Atlanta, Chicago, Indianapolis, Milwaukee, Philadelphia, Pittsburgh, Cincinnati, Louisville, Jacksonville, New Orleans.
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Don't Buy a Trailer Until—



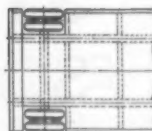
—YOU have investigated the improved models of the C. R. Jahn Company. Here is a standard line of trailer designs to care for every heavy hauling problem. Designs include complete combinations of wheel arrangements for every type of load, conforming to the State regulations in practically every State. Greater strength has been secured without increasing weight. An improved type of oscillating axle provides for better distribution of load.

Small diameter wheels and tires make possible low loading platforms and easier loading.

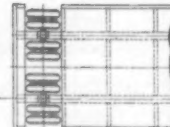
If you are considering the purchase of a heavy duty trailer, be sure to get full details from

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Builders Building Chicago

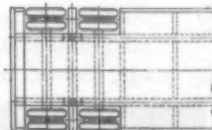
Single rear axle used on four wheel trailers mounted on single or dual tires.



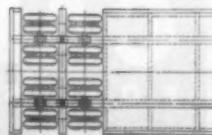
Dual axles of the oscillating type used on six wheel trailers placed crosswise of the rear of the frame.



Tandem rear axles used on six wheel trailers are mounted on large rocker beams.



Multiple rear axles available in capacities from 25 tons up. Two oscillating axles placed in tandem and mounted on large rocker beams, provide for the perfect distribution of load over all tires.



Heat Bakes Grade On Concrete Job

(Continued from page 24)

669 pounds of cement to which was added 5.25 gallons of water at the paver.

After driving over the Surgrader the trucks went forward close to the paver where they were turned on a Blaw-Knox turntable. The batch trucks and the Koehring 27-E paver all ran within the 10-inch Blaw-Knox forms. Immediately behind the tail-grader attached to the paver the concrete crew unrolled the seven strips of Ruberoid paving felt over the subgrade and then the puddlers cast some concrete over it to hold it in the wind.

Two steel men set the alternate cross bars 12 feet long and $\frac{5}{8}$ inch in diameter staggered 9 inches from either side and 3 feet apart and held them at the proper elevation temporarily with long-handled supports which were removed as soon as the concrete reached them. A side bar 9 inches from the form was threaded through the tail-grader and had a diameter of $\frac{5}{8}$ inch. Two 12-foot bars each side of the longitudinal center bars which were 9 inches each side of the center line were placed each side of all expansion and contraction joints. The expansion and contraction joints alternate at 30-foot intervals. The expansion joints consisted of $\frac{3}{4}$ -inch pre-moulded material with an assembly of dowels and transverse rods welded together. The dowels were $\frac{3}{4}$ -inch diameter, spaced 1 foot center to center and the transverse bars were 6 inches from the joint and 8 inches apart. When the dowels had been pushed through the premoulded material in the assembly frame, then two more transverse bars just like the welded ones were tied to the ends of the dowels thrust through the joint at the same spacing. The concrete on both sides of the joints and along the forms was vibrated by a Mall gasoline vibrator with the power unit mounted on a pipe frame and moved like a wheelbarrow on a rubber-tired wheel.

The concrete crew consisted of two puddlers, two steel men who also spread the paving felt, two men on joints, one vibrator man, one paver operator, one man dumping the batches, one man oiling forms, one finisher operator, two bull-float men, two hand finishers, two

men on lip curb, two men on burlap, two sprinklers, two men on Curcrete, whitewash and pouring joints and a foreman on curing.

The Ord finisher was equipped with a burlap canopy to protect the operator from the sun. The finisher pulled a Flex-Plane center strip machine on the second pass over the concrete. A large wheel cut the slot for the center strip which was fed from rolls into the slot by the man on this work.

The center strip installation was followed by the two bull-float men with a 12-foot float, then two 10-foot straight-edges used as drags and a 4-foot float for touching up any low or high spots. The finishers then used two 8-inch canvas belts to complete the finishing.

The lip curb men laid up the curb 3 inches high on the 10-inch slab, 3 inches wide at the top and sloping to the slab 12 inches from the side. The burlap was placed wet and sprinkled for 24 hours and then removed, the slab straight-edged and the Curcrete sprayed on, a coat of whitewash applied at once to

prevent the absorption of too much heat by the dark colored slab.

Personnel

The Koss Construction Co. of Des Moines, Iowa, was awarded this 11-mile contract for \$326,564.50. The work was done under the direction of J. F. Allen, Superintendent for the contractor and D. F. Raver, Resident Engineer, for the Iowa State Highway Commission.

The Thousandth Scraper

On April 15, 1937, just two years to the day after its first scraper built in Peoria was completed, R. G. LeTourneau, Inc., shipped out the 1,000th scraper built at the Peoria, Ill., plant. This is in addition to the scrapers and other LeTourneau equipment built at the Stockton, Calif., factory during the same period.

Hough-Universal Road Sweeper
Used in Fleets of From Five to Eighteen by 27 State Highway Depts. and by Over 75 Bituminous Paving Contractors.

Manufactured by

THE FRANK G. HOUGH CO.

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Engine

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HOW TO BUILD YEAR 'ROUND—LOW COST

CALCIUM CHLORIDE STABILIZED SOIL ROADS

SOIL-STABILIZATION, pronounced by government and state officials as the greatest discovery in highway construction in years, permits the building or improving of secondary roads with local labor from local materials, at the lowest possible cost.

This book describes in detail the principles of stabilization with calcium chloride, and gives specifications for binder soil, fine and coarse aggregates mixtures. It tells how to find, test, proportion and bind these materials. It gives information on drainage, crown, maintenance. Full of photographs,

charts, tables, testing methods, and general data, it is a book that every highway official will want—a book he can depend upon—a book that will save him much time and money, give him more good roads for less money.

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FOR STABILIZING ROAD SURFACES

SIMPLE RUGGED DEPENDABLE

SELF PRIMING PUMPS

STERLING QUALITY

TRASH TYPE IMPELLER

Sterling self-priming pumps are equipped with heavy-duty impellers of highly efficient design, made of wear-resisting close grain nickel semi-steel. The impellers are of the wide blade open trash type and are especially designed to handle large percentages of solids.

Write for new Contractors' Catalog No. 37 which tells about the many other superior features of Sterling pumps.

Sterling

MECHANICAL CORPORATION

1000 North Dearborn Street, Chicago, Ill.



The White Front-End Loader

Front-End Attachments Taken Over by White

Front-end attachments for wheeled-type industrial tractors, known as Trackson-Lessmann, heretofore manufactured by the Trackson Co., of Milwaukee, Wis., are now being made by the White Mfg. Co., of Elkhart, Ind. This type of equipment for mounting on crawler tractors will continue to be made by the Trackson Co.

The material handling equipment affected by this arrangement includes excavators, graders, backfillers, loaders and platform hoists, all of which have been in use for a number of years, and which will be known hereafter as White front-end attachments.

Five models are being offered. Model R-10 is an excavator, grader and material mover, with a $\frac{1}{2}$ -cubic yard bucket or shovel and a 3-foot lift. Model R-22 is a loader with a $\frac{3}{8}$ -cubic yard bucket and a 7-foot lift to load standard motor trucks at the side or rear. Model R-30 is a special high-lifting machine, with an 8 $\frac{1}{2}$ -foot lift and a $\frac{5}{8}$ -cubic yard bucket, principally for handling snow, cinders and other light weight materials.

The backfiller or grader with a 6-foot x 20-inch moldboard is known as Model R-35. The blade can be tilted or set at an angle to push material to either side as well as straight ahead. Model R-40 is equipped with a pronged fork. Model R-45 is a platform hoist for vertical lifting, with a capacity of 4,000 pounds and a 6-foot lift.

The White loaders are powered by the tractor engine through standard power take-offs with multiple disc clutch and suitable controls. Automatic stops are provided at the top of each lift as well as automatic brakes to hold buckets or platform at any height.

The equipment now in production is applicable to Fordson tractors, but the full line will be adapted as rapidly as possible for other makes of industrial wheel-type tractors.

A New Culvert Cleaner

To solve the problem of removing dirt from filled or partly clogged culvert and drain pipe which extend underground, the Monarch Road Machinery Co., Grand Rapids, Mich., has developed the Morco culvert cleaner. A combination shovel and hoe, it both digs and holds the material in the scoop. When digging, the hoe section automatically lifts up, permitting material to fill the scoop. Withdrawing, the hoe section drops down which prevents dirt from dropping back into the pipe.

The handle is made up in sections of $\frac{3}{4}$ -inch water pipe and can be extended to any desired length. The scoop is designed for use in 10-inch and larger size pipe. Literature describing and illustrating this tool may be secured direct from the manufacturer.



"Performance"—your best Salesman

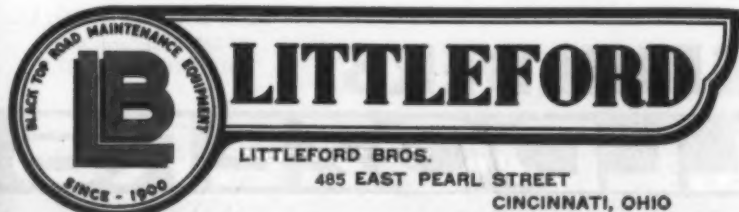
Users of Littleford Model "C" Pressure Distributors say that the better type of job they can do—the superior performance of their Model "C" distributors—sells itself to their customers—enables them to get more work, at a profit.

Now, we do not claim that you will have a monopoly on all the application work in your bailiwick the instant you start using a Littleford Distributor.

But!—We do guarantee you that the new Littleford Model "C" gives you many mechanical advantages. It is simpler and easier to operate. Faster, safer heating. Instant cut-off without dribbling at the spray bars. Accurate Application.

In short, this New and Modern Distributor is a premium model at no premium in cost. Premium Performance at regular prices.

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MOTOR GRADER

Unbeatable for general maintenance work. Inexpensive and light in weight yet exceptionally rugged for its size. Has full hydraulic control.

MASTER DIESEL
MOTOR GRADER

Strong enough to do all the work when the going gets tough, yet easily operated by full hydraulic control. Case model LI tractor unit or McCormick-Deering Model TD40 Diesel engine.

No. 10 LEANING
WHEEL GRADER

Equipped with hydraulic control, has every improvement and many exclusive features for dependable and easy operation. Also No. 108 and No. 110 Leaning Wheel Graders with manual control.



TRENCH ROLLER

Especially designed to meet a long-felt need in roads and street construction. Also chief, warrior, tandem and portable rollers.

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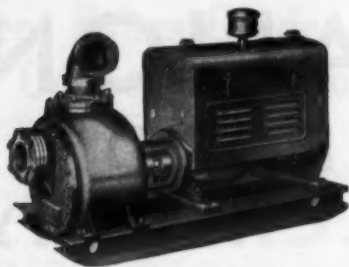
BY constantly seeking for better ways of doing things, and by studiously avoiding the rut of self-satisfaction, Galion engineers have kept our line of road machinery in a position of leadership... it has been the outstanding choice for many years.

If it's Galion... you make no mistake.

THE GALION IRON WORKS
AND MANUFACTURING CO.

Galion, Ohio





The New Sterling 10-Inch Centrifugal Pump

New 10-Inch Self-Priming Pump Handles 200,000 GPH

The Sterling Machinery Corp., 411-13 Southwest Blvd., Kansas City, Mo., has recently added to its line of contractors' pumps a 10-inch self-priming unit with a capacity in excess of 200,000 gallons per hour.

This pump is equipped with a specially-designed open trash-type impeller, will handle large solids, has the pump shaft supported on two heavy-duty deep groove-type ball bearings, and is furnished with a built-in suction check valve and a vacuum gage.

Complete information on this new pump may be secured by writing direct to the Sterling Machinery Corp. and mentioning this magazine.

New Truck Diesels With Greater Power

More power and greater economy are claimed for the new Waukesha-Ricardo Comet diesel engines recently announced by the Waukesha Motor Co., Waukesha, Wis. Superseding the current models, this new series of Mark III Comets will comprise but two sizes for the present, a small six of 462 cubic inches, developing 110 hp at 2,000 rpm, and a large six of 648 cubic inches developing 150 hp at the same speed. These two engines are in reality the refinement by another year's research work of the two current models of the same size. The engines are similar in major respects, differing chiefly in details of construction.

The Model 6D-140-648, the 150-hp engine, is designed for heavy-duty long-distance high-speed truck and bus operation where exceptional power and stamina are required. It has a bore and stroke of 5 and 5½ inches, a 4-inch, 7-bearing hardened alloy steel crankshaft 25 per cent stiffer than its predecessor, and heavy wall steel-backed silver-cadmium precision bearings. The smaller engine, Model 6D-110-462, has a bore and stroke of 4¾ and 5½ inches, a 3¾-inch, 7-bearing hardened alloy steel crankshaft also running in steel-backed silver-cadmium precision bearings. No shims are used in the main bearings of either of these models.

The most important development from the standpoint of fuel utilization, according to the manufacturers, is the new

combustion chamber design. In the Mark III piston head are two intersecting hemispherical depressions connecting with the orifice leading to the Comet chamber in the cylinder head casting. The additional clearance volume created by these hemispherical depressions in the piston reduces correspondingly the volume and size of the Comet chamber in the cylinder head proper so that, under full load, the fuel charge is burned at a somewhat slower rate than would occur if the entire air charge were within the spherical chamber alone. Thus, a more orderly combustion takes place which results in smoother full load operation.

The improved overall efficiency is the result of adding many small gains improving combustion conditions. Tests on the dynamometer have shown power improvements as great as 12 per cent and fuel economy improvement of the same order at the same time.

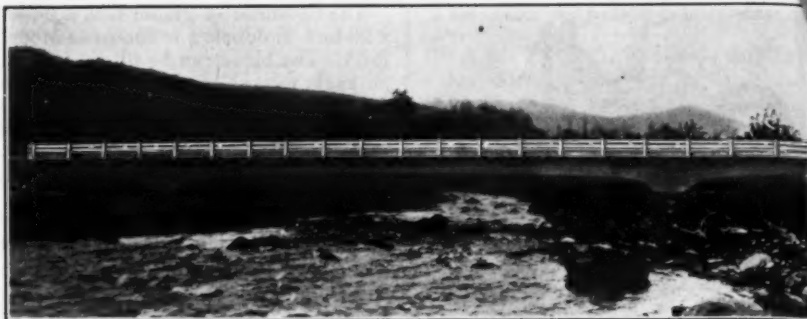
A New Four-Wheel Scraper Announced by Bucyrus-Erie

Using a three-point suspension, with ample clearance to swivel the front wheels under the frame, the new four-wheel scraper for excavating and dirt moving recently announced by the Bucyrus-Erie Co., South Milwaukee, Wis., can be maneuvered in short, sharp turns, making a complete circle within the radius of its own length. As all four wheels are inside the path of the cutting edge, it digs full width in close quarters, and cuts right up against a bank or other obstruction. The dumping action is simple and fast. The bowl backs away and tilts forward sharply, while the apron tips and slides ahead, both to an almost perpendicular angle.

A double-curve cutting edge is constructed to deliver a combined shearing cut and scooping action. The dirt boils up inside the bowl, funneling up into a full heaping load. In spreading, the scraper blade is used to level off the dump.

The box-welded frame which carries the unit is designed to resist both torsional and tensile stresses. Welded plates of high-tensile-strength alloy steel form the bowl and apron. The replaceable cutting edge of high-carbon manganese steel is supported on a rigid heat-treated steel casing, welded into the bowl.

The scraper is regulated by an easy-running single cable operating over a



A Hollow-Box Concrete Girder Bridge, Built by Pierce County, Wash., at a cost of \$3.57 Per Square Foot of Roadway. It Has a Clear Center Span of 100 Feet, Is Designed for H-15 Loadings, Has 20-Foot Roadways and Heavy Curbs. F. R. Easterday Is the County Engineer.

minimum number of sheaves from the drum power unit on the tractor. One control lever, conveniently placed, gives the operator instant and positive control of his loading, hauling, dumping and spreading operations. A 40-hp tractor can handle the 4½-yard scraper in ordinary material. An extra long cable

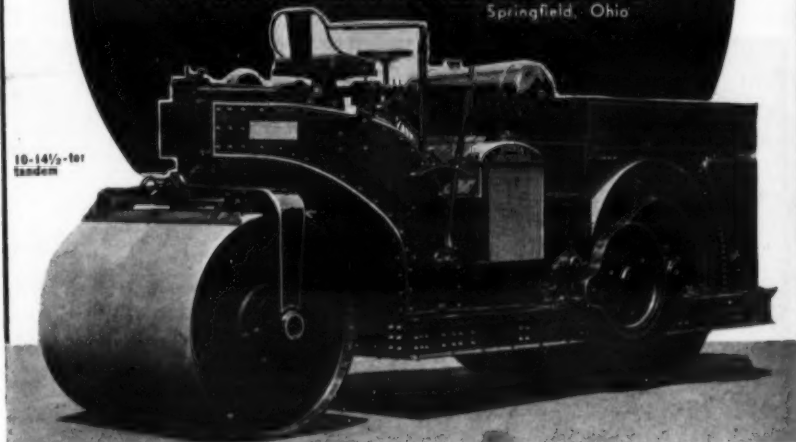
is supplied, with the surplus footage coiled at the rear of the scraper. In case of wear or breakage, the amount needed for replacement is easily fed into the hoist from this coil.

This Bucyrus-Erie four-wheel scraper is manufactured in two sizes, 4½ and 7-cubic yard capacities.

Faithful performance

Faithful performance and economical maintenance have been the pillars of Buffalo-Springfield's reputation for forty-six years.

THE BUFFALO-SPRINGFIELD ROLLER CO.
Springfield, Ohio



BAKER



Above, a Baker Gradebuilder on Sky Line Drive in Virginia, M. E. Gilliox, Contractor, Monett, Mo.

GRADEBUILDERS BULLDOZERS

Judge Them By Their Work

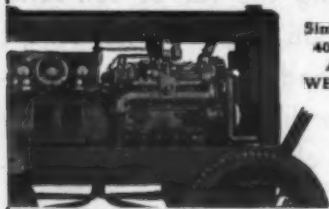
You are asked to judge Baker Direct Lift Bulldozers and Gradebuilders by their performance, not only by our claims. Such features as larger capacity—fewer parts—greater strength—more accurate control—less repairs—tremendous down pressure, account for the large number in use today. If you want machines built for real work and not for quick sales, select Bakers.

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HOBART BROS., Box CE-57, TROY, OHIO

Causes and Remedies Of Concrete Scaling

(Continued from page 27)

Winter Damage

Alternate freezing and thawing, where water has entered hair cracks in a pavement, tends to cause scaling. There is also a possibility that the use of calcium chloride or sodium chloride for ice removal and skidding control has a tendency to cause or to increase scaling. The use of salts to mitigate ice hazards is common, since they are readily applied and easily accomplish the melting of roadway ice.

Unfortunately for definite conclusions, scaling of pavement concrete has too many possible causes to permit certain proof that ice-removal practices are at fault. Opinion on both sides lacks definite evidence, but the fact remains that scaling does occur and that it has reached proportions large enough to call for active investigation of cause and prevention.

It would be as idle to advocate the abandoning of the application of these salts which are so successful in ice removal as it would be to advocate abandoning the use of concrete itself, especially when a simple and inexpensive way of avoiding trouble, such as the use of a low-cost protective film for the surface of the pavement, is available.

Scaling Road Surfaces

Recent experience indicates that a light application of a bituminous curing material to old road surfaces, where scaling seems probable, is effective as a preventive, according to Mr. Hevenor. A suitable asphaltic compound, applied at the rate of 5/100-gallon per

square yard, will cover the pavement with an alkaline-proof membrane. Such an application will undoubtedly prevent scaling and, although it will probably be necessary to apply the material annually, the low cost is more than justified by the results. The application, of course, should be made before the weather gets too cold to allow good con-

tact between the road surface and the bitumen. Bridge approaches, grades and intersections are the points that are apparently most vulnerable. The protective bituminous film will serve a dual purpose—prevent absorption by porous concrete, and retard the grinding action of automobile tires on the weakened surface.

Looking to the Future

As insurance against scaling of roads yet to be built, there is need for greater care in specifications and inspection to make certain of prompt and careful finishing, the prevention of rapid evaporation of the water in the concrete, and the complete hydration of the cement during curing.

ETNYRE "NON-DRIP" Circulating SPRAY BAR !

GREATEST IMPROVEMENT EVER MADE IN DISTRIBUTORS !

● WHEN Etnyre engineers perfected the "Instantaneous Shut-Off" Spray-Bar, eliminating the uncertainty of "suckbacks," a most annoying problem was solved for Contractors and Highway Depts. It prevents "dripping or slobbering" on highways, intersections, cross-walks, etc. A clean cut starting and finishing line is positively assured by the Exclusive Etnyre valve-at-nozzle control of flow of material. Only in Etnyre Distributors—largest selling, most widely used in the world—can you get this great Bituminous Distributor feature. No clogging or congealing of materials—*asphalt, tar, road oil, emulsion*—in the Etnyre "Leakless Valve" Circulating system. Positive accuracy—simple, easy operation—full width distribution—superior double burner heating system—powerful rotary precision pump are other outstanding features of these famous distributors. Send for NEW catalog No. 506-B for complete information.

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DEALERS IN ALL PRINCIPAL CITIES

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HELTZEL BINS
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Long hauls and rough country do not trouble the contractor who uses Heltzel Trailer Type Bins. Heltzel Bins are made for hard service. They combine greatest strength with exceptional erecting and dismantling ease, and remain true and accurate in function for years of exacting use. As Heltzel customers are the first to point out, "You save in set-up and take-down time—you save on maintenance costs—you satisfy every engineer's requirements for accurately proportioned aggregates when you use Heltzel Bins."

The story of Heltzel bin construction is informative. Let us send you the details.

THE HELTZEL STEEL FORM & IRON CO., WARREN, OHIO

Manufacturers of: Central or Truck Mix Plants; Bulk Cement, Storage and Batching Bins; and Large Stationary Storage Bins for Coal, Sand and Stone

Quarrying Rock For Wash. Jetty

(Continued from page 30)

the level of the quarry floor. Loading pockets or enlargements are excavated where necessary to get the right amount of powder at certain points. To move a mass of rock 85 feet high, 200 feet wide and 30 feet thick, and do it with a comparatively slow, heaving force so as not to shatter the rock, the slowest kind of explosive available, black blasting powder, is used.

The black powder comes in 25-pound kegs. It is loaded at points along the drift and in pockets at intervals of about 20 to 25 feet. The kegs at each point are packed closely about a primer consisting of fifteen or more sticks of 40 per cent dynamite. The dynamite primer, fired by an electric blasting cap, ignites the black powder and the whole business goes at once. From 400 to 500 kegs of black powder constitutes one shot on the main face. To put it on a more exact basis, 0.8-pound of powder is used per cubic foot of rock to be moved, on the basis of neat measurement.

In order to confine the powder and make it as effective as possible, the entire drift is "stemmed" as the charges are placed. That is to say, it is packed by hand with material, which ranges from fine stuff up to 8-inch stones. The main tunnel is also stemmed to a distance of 15 feet each way from the loaded drift.

Pneumatic Equipment

Ingersoll-Rand equipment is used almost exclusively at this quarry. The compressor plant supplying the drills contains an Imperial Type 10 compressor. This is a twin unit, with a 12½ x 14 left head compression cylinder, a 20 x 14 right compression cylinder, and run at a maximum speed of 257 rpm. The drills are prepared for reuse by an Ingersoll-Rand No. 34 drill sharpener in the blacksmith shop. The S-49 Jackhammers with wet head attachments have increased to twenty in number. The X-71 wagon drills are still there and a new one, Size FM, had arrived on October 1.

There was some talk around the quarry that these wagon drills might be given another opportunity to demonstrate effectiveness. It was thought that, after more side face was exposed, 30-foot holes might be drilled with them, spaced about 10 feet apart, starting at a point well up on the wall and ranging down at a sharp angle to a level with the quarry floor. By selecting the proper loads, there is a possibility that a good quantity of suitable rock could be kicked out with economy. That remains to be seen, if tried. There is always a chance to make cost reductions and plenty of time to work them out, for the job on the one jetty will last for a year or two more. S. S. Inch, who is Quarry Superintendent for the Columbia Construction Co., is not the type to let well enough alone. If there is any way to knock off a cent or two a ton in cost of production, within the limits of safety, he is out to find it.

From Quarry to Jetty

When it comes to loading the rock on the cars, that is a story in itself. Three large shovels are at work now and probably more will be added as the quarry operations enlarge and there is room for them to operate effectively. One is the 55-B already mentioned as having built the railroad spur and opened the quarry. With the starting of the present contract, a Marion 490 electric was brought up from Bonneville. Next, a new and larger electric was added, a Bucyrus-Erie 85-B, which buckled into the work about October 1. Any one

of these will pick up a rock weighing from 30 to 35 tons and swing it onto the flat car alongside with ease. And don't think that it takes the rock in the dipper. The rock is the equivalent of about a 7 to 8-foot cube. Even in the Class B and Class C rock, there are few pieces small enough to be picked up directly by the dipper. What they do is to take a single hitch around the rock with a short piece of steel cable. The other end, having a loop, is slipped onto one of the bucket teeth and up the piece goes. If it is very large, the tackle will be fastened around the dipper itself.

Down at the other end of the line at the jetty, the procedure is quite simple. Two trestles, containing about 60,000 piles, have been built out over the old jetty, most of which is now under water and sand. The flat cars loaded with rock, as they come from the barge ferry, are pushed out over the trestle by a Shay 70-ton locomotive. An old-

erly Bucyrus-Erie steam shovel is then given the job of unloading the cars. It goes about this sedately, traveling from car to car over a little steel bridge which it picks up from behind and lays down in front with all the dignity of a Sir Walter Raleigh bridging a mud puddle. Pulling out the side boards, it whacks the rocks off over the side with its dipper.

Back at the Engineers' house at the entrance to the trestle, Uncle Sam takes account of each car of rock as it passes, using for the purpose a 200,000-pound capacity Howe scale. In this way, he will have to weigh in about 20,000 cars of rocks as they pass on the way to their final resting place.

Personnel

The work at Gray's Harbor is being done by the Columbia Construction Co. for the U. S. Engineer Department, under the direction of Lieut-Col. H. J. Wild of the Seattle Office. H. J. M.

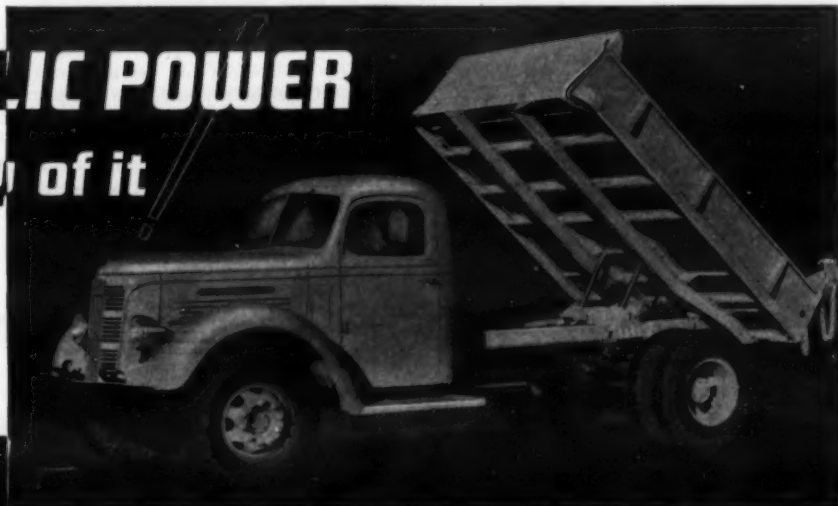
Baker is Senior Engineer on the job. S. S. Inch is Quarry Superintendent for the contractor.

New Adv. Mgr. for Cletrac

Announcement has been made by the Cleveland Tractor Co., Cleveland, Ohio, of the appointment of Paul C. Nordloh as Advertising Manager. Mr. Nordloh has had a wide experience in the tractor and industrial field, and for the past three years was associated with Deere & Co., where he was in charge of advertising and sales promotion for John Deere tractors.

The railroads of this country receive more for transporting gasoline than they receive for the transportation of all the wheat, corn, oats, cotton and tobacco grown in the United States, said Roy F. Britton, Director, National Highway Users Conference.

HYDRAULIC POWER and plenty of it



Heil dump units are powered by dependable hydraulic hoists designed and built to stand up under the terrific strain of constant dumping service—The complete Heil line includes hydraulic dump units of all kinds, for all kinds of jobs and there is a size and type to fit every make of truck—Be sure to get Heil recommendations before you buy—See your nearest Heil dealer or address:

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For Surface Treatment & Skin Patching



Use the No. 101 Sprayer

This modern unit with a powered pump helps you do a better job of surface treatment, skin patching, pot hole and penetration patching, shoulder dressing, curve relocation or widening work. Use either the spray bar on rear or as many hand sprays as you need. Any tar, asphalt, cutback, emulsion or road oil works fine in this outfit. Save on time and on material costs by buying material in bulk. Write, today, for prices.

The Littleford No. 101 Utility Sprayer has twin burners and U type heat flues. Sizes 300 to 1200 gallons for two or four wheeled trailer or truck mounting. Your choice of either 50 or 100 G. P. M. pump with air cooled driving engine. Ask for Bulletin K-5.



LITTLEFORD

LITTLEFORD BROS.

485 EAST PEARL STREET

CINCINNATI, OHIO

Picks and Shovels

(Continued from page 1)

conditions leave the health of the men on the job unimpaired.

And what has all this to do with you? Just this. Too many of us these days have been lulled into a false sense of security on the subject of health. Because smallpox and typhoid fever and the plague no longer ravage our people, we have come to believe that the diseases, like the time in which they were prevalent, are all part of the past. We have forgotten that these diseases are still with us, but that our means of prevention have become so effective that they can no longer exact the toll of lives and slow up human progress as they once did. If, however, we become lax in our vigilance against these diseases, we find they are right there, ready to get to work on the slightest provocation.

This was discovered by a paving contractor in the east last summer when typhoid appeared on his job. One after another of the men went down with the disease, slowing up work on the job, and causing no end of excitement and confusion. An attempt to locate the source of the disease was made and after running down several false leads, during which time more men were taken ill and work slowed up still more, it was discovered that the men had been drinking polluted water.

With the construction season opening up full force, and with hundreds of contractors and thousands of men at work all over the country, it behooves those in charge to give a little thought to the source of drinking water for their men and to insure its purity. It will take very little time and money to do this and the benefits to be reaped from such forethought are many—a smooth-running organization whose work is uninterrupted by illness and the necessity of breaking in new men, and the economic advantage of steady progress on the job, with no time loss from sickness, to say nothing of avoiding a possible liability to a charge of negligence if such an epidemic occurs.

Soil Studies in Missouri

The Highway Department in Missouri very early included geologists in its personnel. The principal responsibility of the geologists was material survey work. However, any problem related to their special training was assigned to them and as soil studies and their application became more important, a Division of Geology and Soils was created as part of the Materials Bureau.

Five field men of this division are employed and assigned, one man to every two of the ten districts. The school training required of the men emphasizes geology, and their special training in soils, as related to highway work, is obtained in initial work in the highway laboratory. Geologists during their training become familiar with surveys and mapping and usually find little difficulty in adjusting themselves to engineering work. It would seem that school training in engineering with geology as a first minor, supplemented by special highway soils work, would furnish the best background for this work now available to the student.

As an aid to the field men, two special soils men keep contact between the main office laboratory and the field men. The routine duty of these field men, as regards soils, is concerned with the location of highways and the preliminary work in design. They check all plans in detail with particular regard to the type of soils which will be encountered in the location proposed. They are generally able to spot critical conditions and note these on the plans.

The Geologist usually accompanies the Division Construction and Survey-Plans Engineer on the final check of the plans for the discussion, final decision

and necessary changes before the contract and specifications are made up. This is a great help in effecting economies in construction. Special duties

under construction are concerned with fill compaction, borrow material, stabilization, special drainage features, and similar problems.

"Quick coupling and uncoupling allow for

MORE TRUCK TRIPS—"



Buckeye
Surface Material
SPREADER

One state highway official says the advantage of the simple, rugged, quick acting coupling device is just one of the reasons why he prefers the Buckeye Spreader. It saves valuable truck time, speeds up the job and reduces the number of trucks required.

But most important — the Buckeye Spreader places any surfacing material exactly where wanted, and in accurate amounts per square yard as called for in the specifications.

Get all the facts — investigate the Buckeye before you buy any surface material spreader this year.

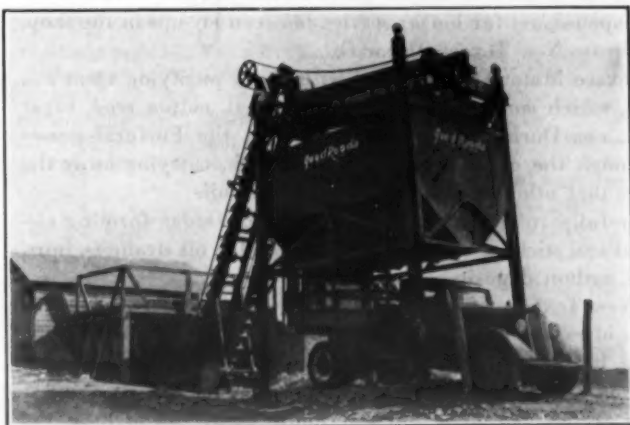
THE BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

TAKE A TIP FROM THE BOYS WHO WATCH THEIR HAULAGE COSTS!

You can learn a lot about bigger profits from the contractors who have found out how to cut down the cost of hauling aggregate. Naturally, the shorter the haul, the lower the cost. That's why so many have found that they make money by buying Good Roads semi-portable crushing and screening plants like the one shown here, and crushing their own rock, excavated on the job.



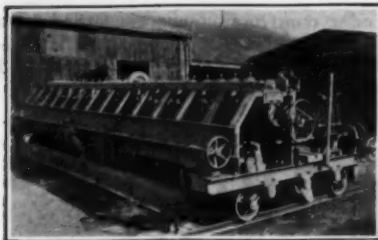
DON'T BE PENNY-WISE AND DOLLAR-FOOLISH!



The cost of such a Good Roads semi-portable plant is soon made up by the money it saves and the satisfaction it gives. And years of satisfaction are built into each Good Roads unit. These semi-portable plants are of the same rugged construction that goes into stationary units. There's nothing weak or flimsy about them, yet they're easy to move and require no permanent foundations.

THE PLANT ILLUSTRATED HERE consists of a Good Roads Champion 30 ton all-steel bin; a Good Roads Champion gear-driven revolving screen; and a Good Roads Champion No. 1020 Roller Bearing Crusher, mounted with 26 foot chain bucket elevator and power unit with V-belt drive.

GOOD ROADS MACHINERY CORPORATION
KENNETT SQUARE, PENNSYLVANIA



Front View of the Danish Type B Road Finishing Machine

A Tamping Road Finisher Developed in Denmark

It is always interesting to know of developments in construction equipment in foreign countries. Recently there has come to our attention a new concrete road finishing machine using a new tamping system to insure a dense concrete. This machine, built by Pedershaab Machine Works, Ltd., Copenhagen, Denmark, uses a series of individual hammer-tampers actuated by eccentrics which cause the tampers to strike the concrete 250 strokes per minute. The machine, which operates on the road forms, is adjustable from 11 to 18 feet in span and on the longer span delivers 6,000 strokes per minute, effecting not only tamping but an actual vibration of the concrete. Each tamper is equipped with a strong steel spring to protect the mechanism against breakage when striking obstructions.

This road finisher is made as two machines or as a single unit. The Type A unit, two machines, consists of first a screeder and hammer-tamper and secondly a screed beam-tamper and finishing beam. The Type B machine has a screed, hammer-tamper and a finishing beam, thus being more comparable to machines made in this country except that the tamping or vibration unit is separate from the screed.

On its first passage over the fresh concrete the Type B machine screeds and tamps the lower layer and the finishing beam is raised. On its second passage the machine screeds and tamps the upper layer and the finishing beam is lowered. Only in special cases is a third passage necessary, in which case the screed and tamper are raised and only the finishing beam is used.

The machines are powered by Ford Model B engines developing 28 hp at 1,200 rpm. The machine has speeds of

6 and 15 feet per minute in both directions and runs on four wheels with either single or double flanges.

Road Grade Crossings Cut One-Half in 16 Years

Minnesota's highway grade crossings, menaces to life and property which numbered 1,282 in 1921, had been cut to 649 at the end of 1936 and will be reduced at least 15 more in 1937, according to a recent report by O. L. Kipp, Construction Engineer for the Minnesota Highway Department.

Minnesota this year has a direct Federal grant of \$1,343,000 to eliminate railroad grade crossings in the state. In addition, at least 14 automatic crossing signals will be constructed this year. There were 42 erected last year, in addition to which 86 grade crossing separation bridges were constructed as well as several highway crossing separations and safety clover leaf turns at intersections.



An All-Welded Heavy-Duty Rogers Trailer Equipped With Pneumatic Tires

Largest Pneumatic-Tired Trailer All Arc-Welded

A new heavy-duty machinery trailer, said to be the largest ever equipped with pneumatic tires, was recently delivered by the Rogers Bros. Corp., of Albion, Penna., to a customer in California.

This new trailer is of 75-ton capacity and is used in hauling power shovels and other heavy equipment.

The overall length of the trailer is 47 feet 9 inches and the width at the deck is 11 feet 6 inches. Its construction is entirely arc-welded, done by the shielded arc process with Lincoln welding equipment. The trailer is equipped with eighteen pneumatic tires.

THEY *thrive* ON IT!

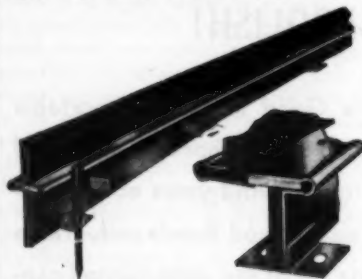


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TEXACO

TRUCK LUBRICANTS



Imperial Dam

(Continued from page 41)

teen bottom-dump and seven 8-yard end-dump Euclid Trac-Truks, four Allis-Chalmers tractors and various other equipment on this section of the work, which involves about a million yards of excavation and as much compacted embankments and fill.

The trenches for the concrete galleries beneath the desilting basins were roughed out with a Northwest dragline, finishing with a clamshell. The bottom is smoothed off by hand and stringers laid along the sides for the side forms to rest on. Rails are laid ahead for the structural steel jumbo which carries the steel inner forms. Three-quarter-inch round reinforcing, spaced 12 and 14 inches, is used both ways, held off the inner forms by pre-cast concrete blocks.

Beginning at the bottom, an entire section 31 feet long is poured continuously, using Ingersoll-Rand vibrators inside the forms and air hammers held against the outside of the forms, to consolidate the concrete. Wood spades are also used. Concrete is poured from Brown-Bevis pneumatic-tired buggies, loaded by gravity from trucks which back up on a ramp mounted on skids. This is moved along the bank as the gallery is poured. Backfilling is done by a bulldozer, the fill being compacted near the structure with air tampers.

The excavations were dewatered by both the wellpoint and sump method, a complete wellpoint system being installed near the river embankment. Complete, Rex, Crane, American and Ingersoll-Rand pumps were used. Some of the clarifier pedestals will rest on bed rock, while others will have a foundation on bearing piles. A dragline and a clamshell handled the excavations. A strong flow of water, not from the river but toward it, has interfered considerably with excavation in the basins, necessitating methods similar to those on the California abutment, in order to dry them sufficiently for concreting.

Rock for Riprap

Near the Arizona end of the dam, Bud and Jim Stringfellow of Los Angeles are quarrying 200,000 cubic yards of stone for lining the channels and basins of the desilting plant, and for riprap below the dam spillway. About

36,000 cubic yards of 3 to 6-foot boulders are being selected for the latter. The quarry is drilled to a depth of 20 feet, on 12-foot centers, using Ingersoll-Rand S-49 jackhammers with Timken bits. The holes are sprung twice, using from a minimum of five sticks the first shot to a maximum of thirty sticks on the second chambering. After blowing out the holes, they are loaded with Halifax free-flowing bag powder, using about 3/4-pound per cubic yard. Rock is loaded with a Bucyrus-Erie 43-B 2 1/2-yard shovel into 8-yard White dump trucks, with all-welded bath-tub bodies.

On a hill nearby, the rock is dumped and sorted, the waste being removed with a bulldozer. The rock must be over 12 inches in diameter but not too large to handle readily in placing. Oversize not suitable for the spillway riprap is drilled with several of the S-49 jackhammers and split with steel wedges driven in the drill holes. An Imperial Type-40 Ingersoll-Rand compressor furnishes the air to both quarry and stone yard. The rock is loaded by hand into 1 1/2-yard steel skips, handled with a sling on the boom of a Bucyrus-Erie 10-B crane. Three hooks are used on the skips, the dumping hook having a pig-tail curl with the point up which makes hooking the ring easier. Chevrolet 3-yard dump trucks haul the stone to the desilting plant, where it is also placed by Stringfellow's men. Bob Ames is Superintendent at the quarry.

Miscellaneous Items

Five miles of railroad was built by the Morrison-Utah-Winston Co. to connect the site with a spur of the Southern Pacific and trains of supplies are brought in by two Plymouth locomotives.

The contractor has a completely equipped machine shop at the dam for doing all such necessary work. An Ingersoll-Rand 1,300-cfm compressor furnishes air for the numerous pneumatic tools in use at the shop and about the dam site. Other shop equipment includes two overhead air hoists traveling the length of the shop, lathes, drill presses, arc and acetylene welding outfits.

The contractor's camp, on a level mesa west of the desilting plant, includes family houses, general offices, hospital, commissary and mess hall.

Personnel

Imperial Dam is being built by the



Part of the Wellpoint System for Dewatering the California End of the Dam Site Near the River Embankment

United States Bureau of Reclamation, the work being under the direction of the Yuma, Arizona, office, with Roy B. Williams, Construction Engineer for the Bureau, in charge. John K. Rohrer is Resident Engineer at the dam and desilting works, with Don M. Forrester as Associate Engineer. The work is part of the Colorado River improvement program authorized by the Boulder Can-

yon Act of 1928.

The general contractor for the project is the Morrison-Utah-Winston Construction Co., made up of Morrison & Knudsen of Boise, Idaho; Utah Construction Co. of Ogden, Utah, and Winston Brothers Co. of Minneapolis. R. M. Conner is General Superintendent and Charles Bradley is Engineer for the contractor.

Roads in the Philippines

The Secretary of Public Works and Communications of the Philippines has released 2,000,000 pesos, or about \$1,000,000, from the Gasoline Fund for road building and maintenance throughout the islands, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. This sum will be distributed fairly evenly among the provinces. In addition, the Public Works Act for 1937 provides a sum of \$200,000 for the construction of roads in Mindanao, one of the two largest islands of the group.



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Users Report—

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A 3/4-Yard Convertible Excavator

158 The features of the Insley Type K-10 3/4-yard convertible excavator, as well as the four-wheel dual-tired trailer for easy transportation of the K-10 from job to job, are described in literature which the Insley Mfg. Co., 801 N. Olney St., Indianapolis, Ind., will be glad to send to interested contractors and engineers.

Stationary Asphalt Plants

159 Hetherington & Berner stationary-type asphalt plants, in mixer sizes of 2,000, 3,000 and 4,000 pounds and with bin capacities of 50, 75 and 100 tons, are described in Bulletin T-252 which Hetherington & Berner, Inc., Indianapolis, Ind., will be glad to send on request.

Complete Line of Wheelbarrows and Carts

160 Complete information on Sterling balanced wheelbarrows and concrete carts to meet the various aggregate, cement and concrete handling requirements of construction jobs, may be secured direct from the Sterling Wheelbarrow Co., Milwaukee, Wis.

Building Skid-Safe Roads

161 The Barrett Co., 40 Rector St., New York City, will be glad to send to interested contractors, state and county highway officials complete information on the use of "tractionized" Tarvia in the construction of good, skid-safe roads at low cost.

New Features of 1937 Trucks

162 Detailed information on the features of 1937 Chevrolet motor trucks, including the new high-compression valve-in-head engine, hydraulic brakes and all-steel cab, may be secured by those interested from the Chevrolet Motor Division, General Motor Sales Corp., Detroit, Mich.

Bituminous Material Distributors

163 Municipal Supply Co., South Bend, Ind., which has had 29 years' experience in the manufacture of bituminous material distributors, will be glad to send full information on these South Bend distributors to interested contractors, state and county highway engineers.

Gas and Diesel Locomotives

164 Midwest diesel and gas mechanical-drive locomotives, in sizes from 5 tons up, for handling hauling and the delivery of materials by contractors' industrial railway, are described in Bulletin 3711, copies of which may be secured free from the Midwest Locomotive Works, Hamilton, Ohio.

A Line and Surface Level

165 Sand's Level & Tool Co., 8631 Gratiot Ave., Detroit, Mich., will be glad to send to road builders, contractors and engineers complete information on the Sand's-Stephens line and surface level which is easily attached to the line and a special feature of which prevents accidental detachment from the line.

Bulldozers and Graders

166 Bulletin No. 587, describing Baker bulldozers and graders for use with Allis-Chalmers tractors, a feature of which is the twin-cylinder hydraulic direct lift, may be secured by those interested direct from the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill.

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A New Leaning-Wheel Grader

167 Bulletin No. 211, describing the new Galion No. 108 leaning-wheel grader, features of which are its completely adjustable blade, full flexibility, better visibility, and strong, sturdy 11-tooth scarifier, may be secured by interested contractors, state and county highway engineers direct from the Galion Iron Works & Mfg. Co., Galion, Ohio.

Dragline Buckets

168 Page Engineering Co., Clearing Post Office, Chicago, Ill., will be glad to send to those interested, complete information on the Page Automatic dragline bucket, which is claimed to increase the profits of your dragline machine from 15 to 25 per cent.

Tarpaulins and Windbreaks

169 Complete information on Fulton tents, tarpaulins and windbreaks for contractors' use may be secured from the Fulton Bag & Cotton Mills, Atlanta, Ga.

Handling Aggregate and Cement

170 Complete information on Erie Aggregate Meters, for storing and batching aggregates and bulk cement, as well as on Erie buckets and overhead traveling cranes, may be secured by those interested direct from the Erie Steel Construction Co., Dept. B, Erie, Penna.

Engine-Driven Welders

171 Westinghouse engine-driven single-operator 200, 300 and 400-ampere welders are described in new literature giving the performance curves of these welders, fuel consumption curves of the engines and general information on the welders and power units. Copies of this new literature may be secured from Westinghouse Electric & Mfg. Co., Dept. 5-N, East Pittsburgh, Penna.

New Road Machinery Booklet

172 The story of Caterpillar track-type tractors and road machinery at work around the world, and showing by illustrations and captions the construction of a pioneer road from the removal of stumps and trees from the right-of-way to the finishing of the dirt road with a diesel tractor and blade grader, is told in a new booklet, Form 4046, which may be secured direct from the Caterpillar Tractor Co., Peoria, Ill.

Features of Heavy-Duty Shovel

173 The features of the Bucyrus-Erie 120-B 4-yard heavy-duty shovel, including quick accelerating swing and positive spotting, ready mobility, wide digging and dumping radius and convenient convertibility, are described in the new 120-B bulletin which the Bucyrus-Erie Co., South Milwaukee, Wis., will be glad to send on request.

Placing Concrete by Vibration

174 This is the title of a new bulletin recently published by the Electric Taper & Equipment Co., Ludington, Mich., discussing the advantages of vibration in placing concrete in dams and other large structures, in grade separation and bridge structures, building construction, and in laying concrete pavement. Copies of this bulletin are yours for the asking by mentioning this magazine.

Retread Machine for Stabilized Roads

175 Complete information on the Parsons Turbo Retread machine, which mixes, windrows, spreads and edges road-mix materials, and is designed for use with every kind of binder, road oil, cut-back asphalt, emulsions, calcium chloride and cement stabilization, may be secured from the Parsons Co., Newton, Iowa, by mentioning this magazine.

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Bulletins and Pamphlets

(Continued from preceding page)

Oil Engines for Construction Equipment

176 The Waukesha-Hesselman low-compression solid injection oil engine, which burns diesel fuel, and is designed to furnish dependable power for construction equipment, is described in Bulletin No. 1010, copies of which the Waukesha Motor Co., Waukesha, Wis., will be glad to send on request.

Precision-Built Ratchet Hand Hoists

177 Catalog Series No. 30, recently issued by the Coffing Hoist Co., 313-319 Van Buren St., Danville, Ill., describes Coffing precision-built ratchet-lever and spur-gear gravity lowering hoists, and electric hoists of diversified application in the construction field.

New Booklet on Guniting

178 A new 65-page booklet, describing the Cement Gun and the various applications of the process of Guniting in construction, has recently been published by the Cement Gun Co., Allentown, Pa. Copies of this interesting and well-illustrated booklet may be secured direct from the Cement Gun Co. by mentioning this magazine.

A Safety Snatch Block

179 The American quick-opening safety snatch block, some of the features of which are its patented positive lock, cast steel cheeks and sheave, Vulcan hook with ball-bearing swivel and heavy-duty construction throughout, is described in a folder which may be secured from the American Safety Snatch Block Co., 2252 Fullerton Ave., Detroit, Mich.

Diversified Traffic-Control Equipment

180 Bulletin E-1A issued by the Signal Service Corp., Elizabeth, N. J., describes in detail and pictures Signal Service reflector signs, Stimsonite reflector units, porcelain enamel warning and street name signs, reflector signals, flashing beacons and electric stop-and-go signals and control mechanisms. Copies may be secured free by mentioning this magazine.

A New Model Motor Truck

181 Check the money-saving features of the new Model 700 White motor truck at your nearest White dealer or write for full details to the White Motor Co., Cleveland, Ohio.

Double-Roll Crushers

182 Bulletin No. 262D, describing and illustrating the features of Telamith double-roll crushers of the gyratory type for secondary crushing, may be secured by those interested direct from the Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis.

Drifters for All Types of Work

183 Worthington screw-feed drifters for light, medium and heavy duty, in three models, 87M of the horseshoe valve type and Models 125 and 150 of the circular valve type, are described and illustrated in Bulletin W-1200-B21 which those interested may secure direct from the Worthington Pump & Machinery Corp., Harrison, N. J.

Catalog on Fluted Steel Pile Shells

184 A new 16-page illustrated catalog on fluted steel pile shells for cast-in-place concrete piles, containing a description of the shells, and the method of installation, specifications for various length pile shells, and many interesting job photographs, may be secured free by interested contractors and engineers direct from the Union Metal Mfg. Co., Canton, Ohio.

Truck Cranes and Shovels

185 The three sizes of Browning truck cranes and shovels, available with diesel, oil or gasoline engines, which can be moved quickly from job to job under their own power, are described in literature which those interested may secure direct from the Browning Crane & Shovel Co., 16226 Waterloo Road, Cleveland, Ohio.

Rooter for Extra Heavy Ripping

186 Isaacson Super Rooters, made in standard or heavy-duty sizes and operated by a tractor already equipped with a hydraulic power unit or cable operated by a winch-equipped tractor, for particularly tough jobs such as ripping hardpan, gumbo, macadam, decomposed granite or sandstone, are described and illustrated in Bulletin 70-3 which may be secured direct from the Isaacson Iron Work, Tractor Equipment Division, 2917 East Marginal Way, Seattle, Wash.

Cutting Material-Handling Costs

187 Literature describing its complete line of portable, sectional and permanent conveyors, which are designed to cut material-handling costs, may be secured by those interested direct from the Portable Machinery Co., York, Pa.

Welder's Range From 45 to 200 Amperes

188 The new Model SA 150 Lincoln arc welder, the range of which offers a large number of welding applications, is described and illustrated in a new bulletin which the Lincoln Electric Co., Cleveland, Ohio, will be glad to send on request.

All-Steel Wire Rope Blocks

189 Duroloy all-steel wire rope blocks, in single or multiple-sheave types, with bronze and roller bearings, features of which are strength, light weight and resistance to abrasion, are described in Bulletin No. 145 which Saucerman Bros., 464 So. Clinton St., Chicago, Ill., will be glad to send on request.

A Rating Scale for Concrete Mixers

190 A novel scheme for checking up on the features of all kinds of concrete mixers, consisting of fifty questions and a percentage rating scale, has been prepared by Ransome Concrete Machinery Co., Dunellen, N. J. One of these True-Value gages will be sent you by Ransome on request.

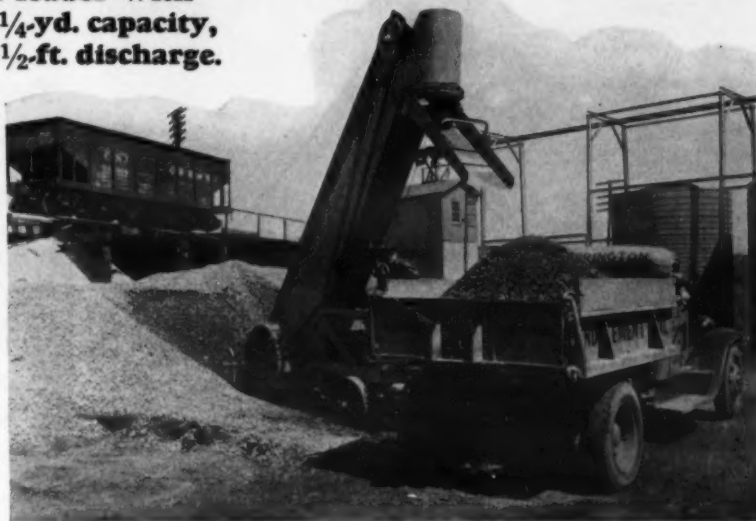
Modern Timber Structures

191 This is the title of a new 12-page bulletin issued by the Timber Engineering Co., Washington, D.C., a subsidiary of the National Lumber Manufacturers Assn., describing Teco timber connections for increasing the joint strength of timber structures such as bridges, trestles, piers, cofferdams, retaining walls, etc. Copies of this bulletin

may be obtained without obligation from the National Lumber Manufacturers Assn., 1337 Connecticut Ave., Washington, D.C., by mentioning this magazine.

FOR THE UP-TO-DATE YARD—NELSON K-4

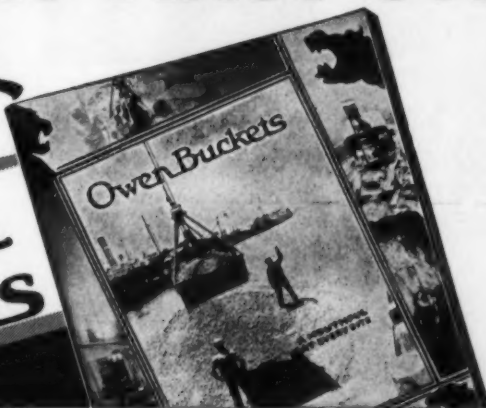
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9 1/2-ft. discharge.



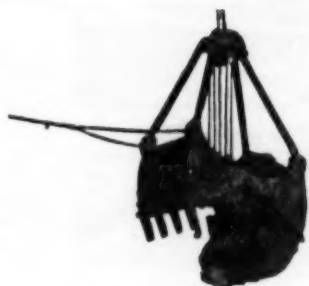
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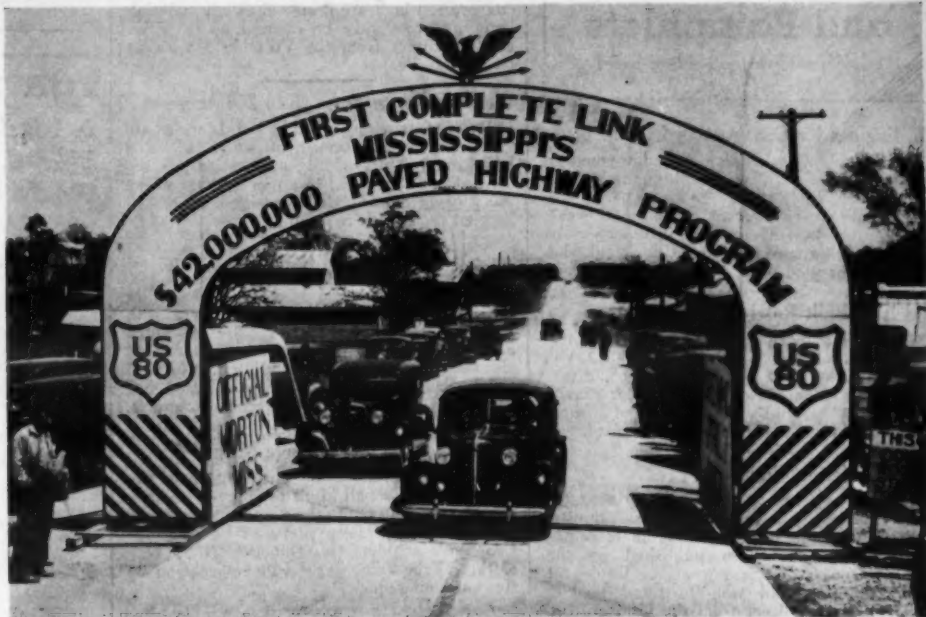
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Contractors and Engineers Monthly



Scene on the George W. Condon Subcontract at Imperial Dam in Arizona. One of the Concrete Plants, and the Shops of Morrison-Utah-Winston, Contractor for the Dam, Are Shown in the Background. See Page 2.



The First Car Entering the First Completed Link in Mississippi's Paved Highway Program Which Was Formally Opened at Morton by Gov. Hugh White Last Month.



C. & E. M. Photos

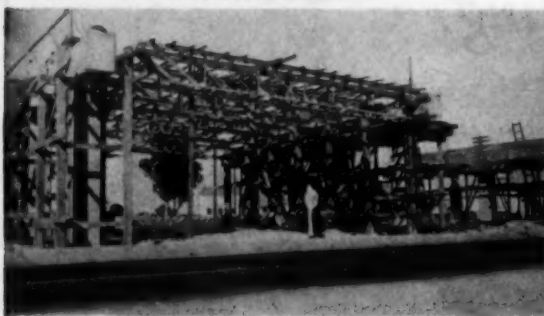
Above, Dumping Widening Strip Material Into the Hopper of Hemstreet & Bell's Novel Spreader For Placing and Rolling Hot-Mix. Left, Spreader In Action on a 15-Mile Road Widening Contract on U. S. 99-E near Los Molinos, California. See Page 5.



The Time-Honored Coyote Hole Is Used at Skookum Chuck Quarry in Washington. Material Is Brought Out in Welded Hand Cars Mounted on Ball-Bearing Rollers. See Page 9.



A Trained Rescue Worker On Call at Chicago's Sewer Project. See Page 36.



C. & E. M. Photos

Left, End View of an Overpass Span, Showing the Truss for Falsework; Center, the Duralumin Screed Used to Insure a Smooth-Riding Bridge Deck; and Right, the Aluminum Forms for Drain Holes. See Page 2.

Garage and Foreman's Cottage at the Big Sycamore Maintenance Station on U. S. 101-A in California, Designed to Harmonize with the Local Architecture. See Page 17.

